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SCHEME OF SOUND SYMBOLS

FOR THE PRONUNCIATION OF WORDS.

Note.—(-) is the mark dividing words respelt phonetically into syllables; (′), the accent indicating on which syllable or syllables the accent or stress of the voice is to be placed.

Sound-symbols employed in Respelling.	Representing the Sounds as exemplified in the Words.	Words respelt with Sound-symbols and Marks for Pronunciation.
ā	mate, fate, fail, aye	*māt, fāt, fāl, ā.*
ă	mat, fat	*măt, făt.*
â	far, calm, father	*fâr, kâm, fâ′thėr.*
ä	care, fair	*cär, fär.*
aw	fall, laud, law	*fawl, lawd, law.*
ē	mete, meat, feet, free	*mēt, mēt, fēt, frē.*
ĕ	met, bed	*mĕt, bĕd.*
ė	her, stir, heard, cur	*hėr. stėr, hėrd, kėr.*
ī	pine, ply, height	*pīn, plī, hīt.*
ĭ	pin, nymph, ability	*pĭn, nĭmf, ă-bĭl′ĭ-tĭ.*
ō	note, toll, soul	*nōt, tōl, sōl.*
ŏ	not, plot	*nŏt, plŏt.*
ô	move, smooth	*môv, smôth.*
ŏ	Goethe (similar to *e* in her)	*gŏ′tĕh.*
ow	noun, bough, cow	*nown, bow, kow.*
oy	boy, boil	*boy, boyl.*
ū	pure, dew, few	*pūr, dū, fū.*
ŭ	bud, come, tough	*bŭd, kŭm, tŭf.*
ú	full, push, good	*fúl, púsh, gúd.*
ü	French plume, Scotch guid	*plüm, güd.*
ch	chair, match	*chär, măch.*
ċh	German buch, Heidelberg, Scotch loch (guttural)	*bóċh, hī′dėl-bĕrċh, lŏċh.*
g	game, go, gun	*gām, gō, gŭn.*
j	judge, gem, gin	*jŭj, jĕm, jĭn.*
k	king, cat, cot, cut	*kĭng, kăt, kŏt, kŭt.*
s	sit, scene, cell, city, cypress	*sĭt, sēn, sĕl, sĭt′ĭ, sī′prĕs.*
sh	shun, ambition	*shŭn, ăm-bĭsh′ŭn.*
th	thing, breath	*thĭng, brĕth.*
th	though, breathe	*thō, brēth.*
z	zeal, maze. muse	*zēl, māz, mūz.*
zh	azure, vision	*ăzh′ėr, vĭzh′ŭn.*

WEBB, *wĕb*, ALEXANDER STEWART, LL.D.: soldier and educator: b. New York, 1835, Feb. 15. He graduated at West Point 1855, and was commissioned in the artillery; served in Fla. and Minn.; was asst. prof. at West Point 3 years; commissioned 1st lieut. 1861, Apr.; capt. May; then Maj. of a R. I. artillery regt. Sep. 14. He was in the first Bull Run battle; then did duty in the defenses of Washington; served through the Peninsular campaign of the Army of the Potomac 1862; was chief of staff in the Md. and Rappahannock campaigns; became brig.gen. of vols. and commanded a brigade at Gettysburg, and there was wounded; commanded a division in the Rapidan campaign; served through the Wilderness campaign, and was severely wounded at Spottsylvania 1864, May; was Gen. Meade's chief of staff in the operations before Petersburg. Gen. W. acted as inspector-gen. of the milit. dist. of the Atlantic 1865-6; then till 1868 was prof. at West Point; became lieut.-col. 44th U. S. infantry 1866, and commanded the 5th milit. dist. 1869. He resigned from the army 1870, Dec.; was brevetted maj.gen. U. S. army 1865; was pres. of the College of the City of New York 1869, July 21, 1903. He pub. (1882) *The Peninsula, McClellan's Campaign of 1862.*

WEBB, *wĕb*, CHARLES: soldier: 1724, Feb. 13—1794; b. Stamford, Conn. In 1758 he was elected to the Conn. legislature, and was continued in it more than 20 years. He served in the French war and rose to the rank of capt.; in 1775, May, he was sent by congress to inspect the works at Ticonderoga; and 1775, July, was commissioned col. of the 19th regt. He took part in the battles of Long Island, White Plains, and Whitemarsh. He resigned his commission 1778.

WEBB, CHARLES HENRY: author: b. Rouse's Point, N. Y., 1834, Jan. 24; d. N. Y. City, 1905, May 24. In boyhood he left his home and spent three years on a whaling vessel. His parents having in the meantime settled in Ill., he returned to his father's home there. He was engaged in commercial business, and was a banker and broker in New York 1856-60. He was employed in an editorial capacity on the New York *Times* 1860-63, and the San Francisco *Bulletin* 1863-4; was editor (1864-66) of the *Californian*, a weekly journal in which 'Mark Twain' and Bret Harte first achieved reputation. Under the pseudonym 'John Paul' he contributed very many articles to the New York *Tribune;* a series of these was pub. under the title *John Paul's Book*. He invented and patented, 1868, 'Webb's adder,' an adding-machine which came into practical use; in 1874 he invented a cartridge-loading machine, sold by the Remingtons. He produced two comedies in San Francisco: *Our Friend from Victoria* (1865); *Arrah-na-Pogue*, burlesque on one of Boucicault's plays.

Among his published volumes are: *Liffith Lank* (travesty of Charles Reade's *Griffith Gaunt*); *St. Twel'mo* (travesty of Miss Evans's *St. Elmo*); *Parodies, Prose and Verse; Vagrom Verse.*

WEBB, GEORGE JAMES: musician: 1803, June 24—1887, Oct. 7; b. near Salisbury, Wiltshire, England. In 1830 he came to this country, and settled in Boston as organist and teacher of music. On the founding of the Boston Acad. of Music, W. was appointed one of the directors. In 1871 he removed to Orange, N. J., and taught his new method of voice culture. In collaboration with Chester G. Allen he wrote *Voice Culture*, and was the author of a number of other works on music. He died at Orange.

WEBB, JAMES WATSON: journalist: 1802, Feb. 8—1884, June 7; b. Claverack, N. Y.; son of Samuel Blatchley W. (q.v.). He was educated at Cooperstown, N. Y.; was commissioned 2d lieut. in the U. S. army 1819, 1st lieut. 1823; was adjt. of the 3d regt. 1826; resigned 1827, and became editor of the New York *Courier*, which 2 years later was consolidated with the *Enquirer*, W. continuing to be editor till 1861, when the *Courier and Enquirer* was merged in the *World*. His newspaper was an influential whig organ. W. was wounded in a duel with Thomas F. Marshall, of Ky., 1842, June; pleaded guilty on indictment for the act; was tried and condemned to imprisonment; but after 2 weeks was released. He was appointed minister to Austria 1849, but the senate refused to approve the appointment. He declined the offer of a brig.-generalship at the opening of the civil war, having solicited a maj.general's commission. As minister to Brazil 1861–70, he settled long-standing claims of U. S. citizens against the govt. of that country. W. pub. *Altowan, or Incidents of Life and Adventure in the Rocky Mts.* (2 vols. 1846); *Slavery and Its Tendencies* (1856); and a pamphlet on *National Currency* (1875).

WEBB, MATTHEW: swimmer: 1848, Jan. 18—1883, July 22; b. Irongate, Shropshire, Eng. He attracted the attention of the public in 1875, by swimming the Thames from Blackwall to Gravesend, and two weeks afterward swimming from Dover to Ramsgate in 8¾ hours. These efforts were preparatory to his feat of swimming the English Channel, 1875, Aug. 24, in 21 hours. In 1883, June, he came to this country for the purpose of swimming through the whirlpool of the Niagara river. He made the attempt July 22, but was drowned. From injuries on his head, it is thought that he struck a rock and became unconscious. He was at one time capt. of a merchant-vessel, and had received one of the first medals of the Royal Life-saving Society.

WEBB, SAMUEL BLATCHLEY: soldier: 1753, Dec. 15—1807, Dec. 3; b. Wethersfield, Conn.; descendant of Richard W., native of Gloucestershire, England, who, 1632, was made freeman of Boston, and, 1635, was associated with the Rev. Thomas Hooker in founding the settlement of Hartford, Conn. W. was sec. of Silas Deane (q.v.), his

step-father, and thus came to be active in the movements that preceded the revolutionary war. When the news of the battle of Lexington reached Wethersfield, W. set out immediately for Boston; and was in the battle of Bunker Hill, where he was wounded: he earned and received the praise of gallantry in general orders. A letter written by him to Silas Deane, and containing a description of the battle, is preserved in the archives of the Conn. Historical Soc. His first appointment in the military service followed soon, and he became aide to Gen. Israel Putnam; 1776 he was promoted lieut.col., and was appointed aide and sec. to Gen. George Washington. W. drafted the general order to the troops around New York promulgating the Declaration of Independence, 1776, July 9. When a letter was received a few days later, from Gen. Howe, addressed to the American commander-in-chief in the style 'George Washington, Esq.,' W. and another of Washington's secretaries sent it back unopened for its failure to recognize Washington's official rank. He took part in the battles of Long Island, White Plains, Trenton, and Princeton, and was wounded at the first two. He took command, 1777, of the 3d Conn. regt., which he had raised and organized at his own charges. With this regt. he served in the disastrous expedition of Gen. Samuel H. Parsons to Long Island, and with his entire command was captured by the enemy's fleet 1777, Dec. 10. He was held prisoner till 1780. Then he was assigned to command a brigade of light infantry, with brevet rank of brig.gen. W. was one of the founders of the Soc. of the Cincinnati, 1783. He settled at Claverack, Columbia co., N. Y., 1789.

WEBB, Thomas: 1724–1796, Dec. 20; b. England. He was an officer in the Brit. army, and served at the siege of Quebec, where he lost his right eye. In 1765, under John Wesley's preaching, he became a convert to his faith, and was licensed to preach. In 1766 his regt. was again ordered to this country, and he was stationed at Albany, N. Y. Here he preached in his own house. In 1767 he went to New York, and with Philip Embury preached for the society of Methodists formed there by Barbara Heck; the same year he established the first soc. in Philadelphia, preaching for it until 1769. He was subsequently retired from the army with rank of capt., and thereafter devoted himself to missionary work. He died suddenly at Bristol, Eng., where he had built a chapel at his own expense, and in which he preached.

WEBB, Thomas Smith: 1771, Oct. 30—1819, July 6; b. Boston, Mass. He learned printing at Boston, and afterward removed to Keene, N. H., where he worked at his trade, and where he became a Mason. In 1793 he established himself in business in Albany, N. Y.; and 1797 published *The Freemason's Monitor, or Illustrations of Masonry*. This he afterward revised, and it became, and still is, authority among Masons. He also published a number of Masonic poems and songs. He was originator of the grand encampment of Masons in the United States. He died at Cleveland, Ohio.

WEBB, William Henry: ship-builder: b. New York, 1816, June 19; d. 1890, Oct. 30. He was educated in the grammar school of Columbia College, New York; learned the trade of ship-building in his father's yard; became manager of his father's business 1843. Under Webb's management were built many ships of war for the United States and foreign governments, as the *General Admiral*, steam-frigate for Russia, 2 steam-frigates for Italy, the *Dunderberg*, iron-clad ram for the U. S. government. In 1890 were erected buildings at Fordham, N. Y., for an 'academy and home for ship-builders,' founded by Webb. The objects of the academy and home are: 1. Relief of 'aged, indigent, and unfortunate men' who have been engaged in any department of ship-building in the United States; relief also of their widows. 2. Providing for American young men of good character gratuitous education in the profession of ship-building and machine-engine building, together with free maintenance.

WEBB CITY: city in Jasper co., Mo.; on the St. Louis & San Francisco, the Kansas City, Fort Scott & Memphis, and the Missouri Pacific railroads; 5 m. n.w. of Joplin. It is in a fruit-growing and farming region, and has valuable deposits of lead and zinc ores. There are 8 churches, graded schools, several smelting-works, banks, and daily and weekly newspapers. Pop. (1900) 9,201; (1910) 11,817.

WEBER, *vā'bėr*, Albrecht Friedrich: philologer: b. Breslau, Prussia, 1825, Feb. 17; d. 1901, Dec. 1; son of Friedrich Benedikt Weber, prof. of national economy (1774-1848). Weber studied philology, classical and oriental, at Breslau, at Bonn, and at Berlin under Bopp; and was appointed, 1856, prof. of ancient Indian languages and literature in the Berlin Univ. His writings on the languages of India and the East are very numerous. His two most important works are an ed. of the *White Yajurveda* (1849-59, 3 vols.), and *Indische Studien* (1849-85, 17 vols.). He pub., 1882, *Ueber den Kupakshakshakausikâditya des Dharmasâgara*, and *Ueber das Uttamacaritrakathânakam*.

WE'BER, Carl Maria Friedrich Ernst von: musical composer of great eminence: 1786, Dec. 18—1826, June 4 or 5; b. Eutin, in Holstein. Musical and dramatic talent had been hereditary in his family for generations; his father, a baron, by turns officer in the army of the Palatinate, finance-minister of the Elector of Cologne, music-director to the prince bishop of Eutin, director of opera at Lübeck, and head of a company of strolling players, led an irregular and thriftless life. Young Weber showed early a genius for music, but his instructors were often changed by his father's change of residence. The teachers to whom he owed most were Hauschkel at Hildburghausen, Michael Haydn at Salzburg, and Valesi and Kalcher at Munich. His father's impatience and lack of

judgment were injurious to him in many ways, particularly in bringing him before the public prematurely as a musical prodigy. From this course of life, however, the child drew one advantage, that of early familiarity with the stage; and he seems to have instinctively developed himself as a gentleman. At the age of 13 he composed an opera, *Die Macht der Liebe und des Weins.* The next year his second opera, *Das Waldmädchen*, was brought out, without success at first; but was afterward far better received than he himself thought it deserved. The next effort of the young opera-composer was *Peter Schmoll und seine Nachbarn*, composed at Salzburg 1801, performed at Vienna with indifferent success. At Vienna he became acquainted, 1803, with Joseph Haydn and the Abbé Vogler, and studied under the latter. In 1804 he left Vienna, to be conductor of the opera at Breslau, and while resident there composed the greater part of his opera of *Rübezahl.* In 1806 W. was with Prince Eugene of Würtemberg at his court of Carlsruhe in Silesia, where he composed two symphonies and three concertos. In 1807 he went to Stuttgart, as private sec. to Duke Ludwig, becoming also musical instructor to his children; and while there he composed the opera of *Silvana,* and a cantata, *Der erste Ton*, besides overtures, choral pieces, and pianoforte works. Falling into disfavor through his own somewhat irregular life, and into pecuniary embarrassments—the result of his father's recklessnessand embezzlement of the duke's money—he was dismissed from the court of Würtemberg, and resided successively in Mannheim, Heidelberg, and Darmstadt, at the last place composing his operetta *Abu Hassan* He then made a musical tour through Germany, during which his concerts were everywhere well attended. He was director (1813–16) of the opera at Prague, which he entirely remodelled; and during his residence in the Bohemian capital composed *Kampf und Sieg*, and many other songs, including the noble national series from Körner's *Leier und Schwert*, which had much influence in rousing patriotic sentiment during the war of liberation.

In 1817 he was invited to form a German opera at Dresden; and there, during the remainder of his life, he held the post of *Kapellmeister* to the king of Saxony. To this period belong his most important compositions, including *Preciosa*, *Der Freischütz*, *Euryanthe*, and *Oberon.* None of these works, however, were first brought out in Dresden. The music to Wolff's *Preciosa*, whose subject is from a novel by Cervantes, was produced first on the Berlin stage, where it made a powerful impression. The author's *chef-d'œuvre*, the opera of *Der Freischütz*, the libretto of which was written by the composer's friend Friedrich Kind, also first saw the light in the Prussian capital 1822. It was a great success: its novelty and beauty, as well as the deep thought contained in it, excited an extraordinary sensation throughout Germany, which soon extended to France and England. *Euryanthe*, produced in Vienna 1823, was not quite so warmly received: bearing more the impress of labor and cultivation, and less

that of the composer's natural vein of romance, it has never been in such general favor as its predecessor. *Oberon* was written in prospect of a visit to London, to a libretto supplied by Mr. Planché. When W. set out for England, he was already struggling against mortal disease. He appeared at Covent Garden Theatre as conductor of a selection from *Freischütz*, 1826, Mar. 8; and on Apr. 12 also he conducted, on the first appearance of *Oberon*, with applause on both occasions, incessant and uproarious. At his benefit concert May 26, he was hardly able to go through the duty of conductor; and June 5 he was found dead in bed in the house of Sir George Smart, whose guest he was. He was interred in the Rom. Cath. church, Moorfields: but 1844 his body was removed to Dresden; and a statue of him by Reichel was erected 1860 in front of the Dresden Theatre. W. was married 1818 to Carolina Brandt, operatic singer of some note, daughter of Brandt the violinist; and he left children by her.

The verdict of posterity, as well as of his contemporaries, has placed W. in the first rank of musical composers. He was the first to use those bold effects of harmony and modulation whose introduction forms an era in the history of music. He was indeed the creator of 'romantic opera.' In his operas the spirit of the romantic school appears in its brightest and most captivating form; and the overtures are masterpieces of imagination, each presenting an outline of the work to which it pertains. Besides the above operas and songs, his musical works are numerous, comprising concertos for the pianoforte, clarionet, oboe, bassoon, and violoncello, symphonies, and overtures, one of the most beautiful and characteristic of these being the overture to the *Beherrscher der Geister*. Among his posthumous writings is an autobiography. His Life was written by his son Baron Max Maria von W., 1864 (transl. by Simson). See also Jähn's W. (1873); and *Weber*, by Sir Julius Benedict (London 1880).

WEBER, Max Maria von, German civil engineer, son of Karl Maria von Weber (q.v.): b. Dresden, Saxony, 1822, Apr. 25; d. Berlin, Germany, 1881, Apr. 18. He studied engineering in Dresden and in England, and in 1850 entered the civil service of Saxony. He went to Vienna in 1870, where he was engaged in the extension of the Austrian railway system and in 1878 to Berlin on a like service. He wrote extensively, not only on technical themes, but in the field of general literature. His writings include: *Schule des Eisenbahnwesens* (1857); *Karl Maria von Weber: ein Lebensbild* (1864-6); *Nationalität und Eisenbahnpolitik* (1876); etc., besides the posthumously published *Vom rollenden Flügelrad* (1882), to which is added a biography by M. Jähms.

WEBER, Wilhelm Eduard: German physicist: 1804, Oct. 24—1891, June 23; b. Wittenberg, Prussia. He was appointed prof. of physics at Göttingen 1831; retired from the professorship 1837, and became prof. at Leipsic; in 1849 he returned to his post at Göttingen, where he remained until his death. He was noted especially for his researches in magnetism and electricity. He was one of seven 'liberal' professors excluded from Göttingen 1837. In connection with his elder brother, Ernest Heinrich W. (1795-1878), he produced *Die Wellenlehre* (1825); with his younger brother, Eduard Friedrich W. (1801-71), *Mechanik der Menschlichen Gewerkzeuge* (1836); and with Karl Friedrich Gauss, *Resultate aus den Beobachtungen des magnetischen Vereins* (1836), and *Atlas des Erdmagnetismus* (1840).

WEBER, *wē'bẽr*, a river of Utah, whose headwaters are on the west slope of the Uinta Mountains. It flows northwest through fertile lands and through a series of canons; and after a course of nearly 200 miles it enters Great Salt Lake. The famous Weber Canon is the gorge made by this river where it breaks through the Wasatch Mountains. The Union Pacific railroad passes through this gorge. The descent in places is most rapid, and the consequent water-power is extensive. At Ogden, the mean volume of water is about 2,000 cubic feet a second. The Weber is much used for irrigation. The river has built up at Ogden a large delta which extends into ancient Lake Booneville.

WEBER'S LAW: formulation (by Prof. Ernest Heinrich Weber) of a certain constant ratio between differences in sense-perception under varying increments of reductions of stimulation: e.g., we cannot recognize by the touch-sense slight differences in weight when the weights compared are heavy, though we should be perfectly able to make the distinction if the weights were light. The plain inference is that the greater the intensity of the original stimulus the greater must be the increase of stimulus to make the difference perceptible in the resulting sensation. W. L. is the scientific formulation of this conclusion: it is that, in order that the sensation-difference may remain unchanged, the increase of stimulus must maintain *the same proportion* as the intensity of the preceding stimulus. The smallest perceptible difference is therefore not absolutely the same, but it remains relatively the same—i.e., the same fraction of the preceding stimulus. Thus, if we can distinguish 16 oz. from 17 oz. we can also distinguish 32 oz. from 34 oz.; the addition being in each case one-sixteenth of the preceding stimulus.

WEBSTER, n. *wĕb'stĕr:* in *OE.*, a weaver, particularly a female weaver.

WEBSTER: village and tp., Worcester co., Mass.; on the French river, and on the New York and New England and the Boston and Albany railroads; 16 m. s. of Worcester, 58 m. w.s.w. of Boston. It is one of the two co. seats, and is widely known for its manufacturing industries, which include iron and brass foundry products, woolen, cotton, and linen goods, yarn, and shoes. It has several churches and public schools, public library, and 1 weekly newspaper. Pop. (1890) 7,031; (1900) 8,804; (1910) 11,509.

WEBSTER, *wĕb'stĕr*, DANIEL, LL.D.: statesman: 1782, Jan. 18—1852, Oct. 24; b. Salisbury (now Franklin), N. H.; son of Ebenezer W. (q.v.), descendant of Thomas W., who settled in N. H. 1636. After receiving a very elementary education at home, he passed a few months in Phillips Exeter Acad., 1797; then prepared for college under the Rev. Samuel Wood at Boscawen, N. H.; studied at Dartmouth College 1797–1801, meanwhile conducting a school in the winter. After graduation he studied law, and was admitted to the Boston bar 1805; but meanwhile was principal of an acad. at Fryeburg, Me., and copyist in the office of the register of deeds there. He commenced practice at Boscawen, but soon removed to Portsmouth, N. H. He was active in politics at this time as a federalist, and came into general notice first through a strong speech in opposition to war with Great Britain, which won for him nomination and election to congress 1812. In the house of representatives he served on the committee of foreign affairs, and on the floor was prominent in the debates on the war with England and on the finances: he favored an increase of the U. S. navy and rescission of the embargo. In a speech that showed mastery of the data of economic science he vigorously opposed the act to create a new U. S. bank, and was the principal agent in procuring its defeat; so, too, 1816, he favored and procured the passage of a resolution for a return to specie payments.

He removed to Boston 1816, and there resumed the practice of law, rising immediately to the highest rank in his profession. His argument in the Dartmouth Coll. (q.v.) case, which he won on appeal to the U. S. supreme court, 1818, Mar. 10, brought to him retainers in many of the great causes of the time. He was a leading member of the Mass. constitutional convention 1820; the same year he delivered his memorable oration at Plymouth, Mass., on the 200th anniversary of the landing of the Pilgrims. He was again representative in congress 1823–27, and then entered the U. S. senate to fill an unexpired term. He was re-elected again and again to the senate till 1841. The memorable acts of his career in the house after reentering it, 1823, were: a statesmanlike speech on the Greek revolution 1824, his carrying a bill for revision of the federal laws, and his vigorous advocacy of the calling of a congress of representatives of American states at Panama to provide for the consolidation and independence of the Spanish-American republics. His famous

oration at the laying of the corner-stone of the Bunker Hill Monument, and his eulogy of Adams and Jefferson, belong to this period. In the senate his first speech was in opposition to a comparatively high tariff on woolen fabrics, but he cast his vote for a bill (which became law) for a rather high tariff; and later he was a steadfast advocate of protective duties. His great speech in reply to Senator Hayne was delivered in the senate 1830, Jan. 26–7. It fell to W. to defend the northern states against the attack of Hayne, who, in debate on the survey of the public lands, had made a bitter attack on the people of the north, and especially of New England, and who first gave expression in the federal legislature to the doctrine of nullification. Though strongly opposed to Pres. Jackson on political or partizan issues, W. cordially supported Jackson in his measures to suppress the attempt to carry the nullification doctrine into effect. He advocated, in a great speech, renewal of the U. S. Bank's charter, 1832, May; and the same year, while supporting Henry Clay's candidacy for the office of pres., opposed the compromise tariff bill and voted for the 'force bill' aimed against the nullifiers of the south. When the whig party was organized, 1834, W. was its principal leader in the north. He was active 1840 in the presidential canvass, working for the whig nominee, Gen. William H. Harrison; and Harrison, when elected, chose W. for sec. of state, 1841, Mar.; after Harrison's death, W. continued to hold the office under Pres. Tyler. His diplomatic ability was manifested during his secretaryship in the negotiation of the Ashburton treaty with Great Britain, 1842, Aug. 9.

Resigning office 1843, May, W. returned to the practice of law in Boston, and declined a seat in the senate. When the Bunker Hill Monument was completed, he delivered the oration at its formal dedication, 1843. He was already (1840) the choice of the Mass. whigs for the presidency; again, 1844, he was a favorite candidate; but cordially supported Henry Clay, and opposed the admission of Texas to the Union as a state. Returned to the senate 1845, Dec., he opposed the Mexican war; but his son Edward, maj. of a Mass. regt. of vols., died in the military service at Mexico. Again W. was before his party in national convention for nomination to the presidency 1848, but Gen. Zachary Taylor won the prize. The annexation of Mexican territory and the admission of Texas had brought complications and perils which filled W. with alarm for the perpetuity of the Union; therefore in the interest of peace he favored compromise measures in relation to the existence and extension of slavery, and defended from that point of view the Fugitive Slave Law—so losing the approval and support of his most attached friends in the whig party. After Pres. Taylor's death, Pres. Fillmore chose W. sec. of state 1850, July; in that term of office he conducted with characteristic energy and ability the correspondence with the Austrian govt. in the Martin Kotzta case. In Fillmore's administration, W. vigorously enforced the laws of the United States against filibustering;

but when the followers of the filibuster chief Narciso Lopez fell into the hands of the Spanish govt. in Cuba, and were deported to Spain, W. interceded for their pardon. He also during the same term of office had to maintain the rights of U. S. citizens against British pretensions in Central America and on the N. American fishing-grounds; he negotiated a treaty of reciprocation between the United States and Canada. His last great political speech was made in Boston 1850, Mar. 7, advocating compromise on the slavery question: it aroused public indignation in Mass.; and, as events proved, was a political mistake. W.'s last public speech was at the laying of the corner-stone of the additions to the Capitol buildings in Washington, 1851, July 4; his last forensic effort was in the trial of the Goodyear patents case at Trenton, N. J., 1852, Jan. In the same year he was defeated by Gen. Winfield Scott in the candidacy for the whig presidential nomination: this result was doubtless a serious disappointment to W. In failing health he left Washington for his home by the sea at Marshfield, Mass.; and there within three weeks, he died. His grave is at Marshfield.

W. had abilities of the highest order, but they were not those of a party leader. His lot was cast in a time when questions portentous in their moral and political bearings filled the air—questions within which lay unseen the germ of terrific conflict and of vast and astounding change. The portents he seems to have recognized, but to have failed in his attempt to read their deepest meaning. He was a statesman, an accomplished diplomat, and an expounder of constitutional law. Few grander orators have lived: he despised mere rhetoric; his sentences were simple in form, and often massive in meaning; his whole style was direct, and his arguments were such as to impress alike the learned and the unlearned. Indeed, his power of stating a case was such that his mere statement frequently had all the force of a sufficient argument.—See *W.'s Works*, with sketch by Edward Everett (6 vols. Boston 1851); *W.'s Private Correspondence*, ed. by his son Col. Fletcher W. (2 vols. Boston 1856); Geo. Ticknor Curtis's *Life of W.* (2 vols. New York 1870); H. C. Lodge's *Webster*, in Amer. Statesmen Series (1883).

WEB'STER, Ebenezer: patriot: 1739–1806; b. Kingston, N. H.; father of Daniel W. (q.v.). He served in the 'old French war' as private soldier; was, 1761, one of the earliest settlers of Franklin (originally Salisbury), N. H., where he was farmer and innkeeper. He led the Salisbury militia to Cambridge to join Washington's army before Boston 1775, and served in the army till the end of the war. For several years he represented his town in the N. H. assembly and senate, and 1791 till his death was a judge of the common pleas court of Hillsboro co., N. H.—W. recognized in his son Daniel extraordinary gifts; and in straitened pecuniary circumstances made great sacrifices to give him a collegiate education.

WEBSTER, JOHN: dramatist: appearing as a writer for the stage first in 1601. His history as rehearsed by Algernon C. Swinburne is, that he published 1624 the city pageant for that year, 'invented and written by John Webster, merchant tailor': outside of the period comprised between these two dates there is no record of act or work of his. There were pub., 1607, two comedies and a tragedy 'written by Thomas Decker and John Webster.' His dramatization of the life of Lady Jane Grey is pronounced to have been probably 'a rough piece of patchwork by W. and others:' the play is not extant. But, 1612, W. 'stood revealed as a tragic poet and dramatist of the very highest class,' by his tragedy *The White Devil*, known also as *Vittoria Corombona*. W.'s *Duchess of Malfi* (Amalfi) Swinburne declares to be 'one of the imperishable landmarks of literature.' Many years later came *Appius and Virginia* and *A Cure for a Cuckold*.—W.'s works were first collected 1830 and pub. by the Rev. Alexander Dyce.

WEB'STER, JOSEPH DANA: soldier: 1811, Aug. 25—1876, Mar. 12; b. Old Hampton, N. H.; son of Josiah W., minister at Hampton 1808–37. Graduating at Dartmouth 1832, he studied law; became clerk in the war dept., Washington, and was made U. S. civil engineer 1835; was commissioned 2d lieut. of topographical engineers 1838; served in the Mexican war; resigned from the army, with rank of capt., 1854, to practice in Chicago as civil engineer. He perfected a system of sewerage for Chicago, the execution of which necessitated raising the grade of a large part of the city and involved many great and novel engineering feats. At the beginning of the civil war he was charged with the construction of fortifications at Cairo, Ill., and Paducah, Ky.; became col. of an Ill. artil. regt. 1862; as chief of Gen. Grant's staff was present at Fort Henry and Fort Donelson; at Shiloh he was chief of artillery. He was commissioned brig. gen. 1862, Nov. 29, and served as milit. gov. of Memphis and as milit. supt. of railroads; he was again Gen. Grant's chief of staff at Vicksburg, and held a like post under Gen. Sherman from 1864 till the end of the war. Having been brevetted maj. gen. of vols. 1865, Mar., he retired from the army and went back to Chicago; there he was assessor of internal revenue 1869–72, afterward asst. U. S. treasurer, and finally collector of revenue.

WEB'STER, NOAH, LL.D.: lexicographer: 1758, Oct. 16—1843, May 28; b. Hartford, Conn.; descendant of John W., who prior to 1660 was one of the magistrates of Conn. and gov.; descendant, on his mother's side, of William Bradford, second gov. of Plymouth colony. He was a student at Yale when the revolutionary war began, and quit his studies to serve in a company of militia commanded by his father; he graduated at Yale 1778; studied law and was admitted to the bar, but did not begin practice. He then took charge of a school at Goshen, N. Y., and there wrote his *Grammatical Institute of the English Language* (Hartford 1783–85, 3 parts). In this work was contained *Webster's Spelling Book*, which, published as a separate work, was circulated in enormous editions. The

Speller is still in use, and more than 60,000,000 copies have been sold. The royalty of one cent a copy on the *Speller* afforded Webster an income during the years when he was occupied with his great *Dictionary.* His series of letters under the signature *Honorius* aided powerfully in winning public favor for the proposal to give to the revolutionary soldiers pay for 5 years beyond their term of enlistment. He published 1784 a pamphlet, *Sketches of American Policy,* in which he favored greater centralization of government. He lectured in many cities, 1786, on the English language, and published his lectures 1789—*Dissertations on the English Language.* After the adjournment of the constitutional convention at Philadelphia, he published a pamphlet showing the *Leading Principles of the Federal Constitution.* He was engaged in law practice in Hartford 1789-93; then established in New York a daily federalist newspaper, the *Minerva.* He also wrote and published several other pamphlets on political and financial questions. In 1807 appeared his *Philosophical and Practical Grammar.* He had been collecting and digesting material for his *Dictionary,* but now (1807) entered on that work as his principal occupation. Finding difficulties in etymology, he gave ten years to its study, and prepared a 'synopsis of words in 20 languages' for his own use, which is still in MS. When the great work was near completion, he went to Europe, 1824, to consult scholars and to have access to libraries. The first edition (2,500 copies) was published 1828, and was immediately reprinted in England. It added 12,000 words and 40,000 definitions to those in previous dictionaries. This monumental work in its successive editions has had high rank and an unprecedented circulation.—Webster was the first president of the board of trustees of Amherst College; was for several years alderman in New Haven, Conn.; was once a judge, and was member of the legislature both of Connecticut and of Massachusetts.—See Life, by Scudder (1882).

WEBSTER, Sir Richard Everard, 1st Baron Alverstone: English jurist: b. 1842, Dec. 22. He was educated at Cambridge, was called to the bar in 1868, became queen's counsel in 1878 and was attorney-general in Lord Salisbury's cabinet in 1885-6, 1886-92, and 1895-1900. He was returned to Parliament for Launceston in 1885, and in 1885-1900 was member for the Isle of Wight. He was knighted in 1885, created a baronet in 1900 and in that year was raised to the peerage. In 1893 he was one of the British representatives before the Bering Sea Arbitration Tribunal. He was Master of the Rolls, May-October 1900, and was then appointed chief justice. He served as a member of the Alaskan Boundary Tribunal in 1903.

WEBSTER-ASHBURTON TREATY, The: in American history, a treaty between the United States and

Great Britain, negotiated by Daniel Webster and Lord Alexander Baring Ashburton in 1842, August. By this treaty the frontier line between the state of Maine and Canada was definitely agreed to. By this agreement seven-twelfths of the disputed ground, and the British settlement of Madawaska, were given to the United States, and only five-twelfths of the ground to Great Britain; but it secured a better military frontier to England, and included heights commanding the St. Lawrence, which the award of the king of Holland, who had been chosen arbiter, had assigned to the Americans. By the 8th and 9th articles, provisions are made for putting an end to the African slave-trade; and the 10th article provides for the mutual extradition of suspected criminals.

WEBSTER CITY, Iowa: county-seat of Hamilton co.; on the Boone River, and on the Webster City & S., the Chicago & N., and the Illinois C. R.R.'s; about 70 m. n. of Des Moines. It is in an agricultural region, in which there are a number of coal mines. It has a shoe factory, foundry, machine shops, iron furnaces, flour mill, grain elevators, and large coal yards. It has a high school, graded public and parish schools. The four banks have a combined capital of $275,000. Pop. (1910) 5,208.

WEBSTERITE: n. *wĕb'stĕr-īt* [after *Webster,* a geologist]: a white or yellowish-white earthy mineral, consisting of hydrous sulphate of alumina, soft, with a fine scaly or fibrous structure—known also as *aluminite.*

WEB'WORMS: a name applied to various species of caterpillars or lepidopterous larvæ because of their habit of spinning webs of silk enclosing leaves upon which they feed and also serving as a shelter. As a rule neither the web-spinning nor the social habit is so highly developed as in the tent-caterpillars, but there is no sharp distinction in the application of the two names. The species of caterpillars exhibiting such habits are quite numerous and belong to a number of genera and families of moths. Some of them are of considerable economic importance. The fall webworm is the larva of the small white moth (*Hyphantria cunea*). As soon as they leave the egg all of the larvæ hatching from a mass spin a common web enclosing several leaves. After these are eaten the caterpillars wander farther and farther in search of food, sometimes destroying the entire foliage of a tree, but always return to the shelter of the nest to rest when not feeding. The web may be extended to include whole branches. The caterpillars are covered with long hairs, and there are two broods, one in the spring and one in the fall, the latter being unusual among species of similar habit, wherefore the name. All kinds of shade and ornamental trees suffer from their attacks. As typical of a large and quite distinct group of caterpillars is the garden webworm (*Loxostege similalis*). This is a small, nearly naked caterpillar, which feeds in company

on all kinds of garden vegetables, the leaves of which are drawn together in small webs. Some of the related species form large colonies and one small form is often very destructive to dried clover hay. The root webworms are the caterpillars of the little roll-wing moths. *Crambus vulvivagellus* is a common species which spins a web about the stalks and roots of grass to which, as well as to corn, it is sometimes very destructive. The true tent-caterpillars belong to the genus *Clisiocampa* and family *Bombycidæ* or silk-spinning moths. A quite unrelated species is *Cacœria cerasivorana*, which forms veritable silken tents, sometimes covering small trees entirely. The general method of combating webworms is to destroy their eggs in winter, to burn the newly-formed tents, and to spray the foliage about the tents with arsenical solutions. The ground-webs may be checked by fall plowing.

WED, v. *wĕd* [AS. *wedd;* Goth. *vadi*, a pledge: AS. *weddian*, to engage, to promise: Ger. *wette*, a wager: Dan. *vedde*, to wager (see also WAGE)]: to engage or pledge one's self, as a husband or wife; to marry; to take for husband or for wife; to join in marriage; to attach firmly; to unite by love or fondness. WED'DING, imp.: N. Marriage (q.v.); nuptial ceremony. WED'DED, pp.: ADJ. pertaining to marriage; closely attached. WEDDING-CAKE, a rich cake, frosted with sugar and variously ornamented, made in honor of a wedding, and cut and distributed, or at least distributed, after the wedding. WEDDING-CARDS, the name and address of a newly married couple sent to friends, or the cards of invitation sent out on the occasion of a wedding. WEDDING-DRESS, the garments worn by a bride at the marriage ceremony. WEDDING-FAVOR, a bunch of white ribbons, a rosette, or the like, worn by male guests at a wedding. WEDDING-RING, a plain gold ring placed by the bridegroom on the third finger of the bride's left hand at the marriage ceremony. WEDLOCK, n. *wĕd'lŏk* [AS. *wedlác*, a pledge, a promise—from *wed*, a pledge, and *lác*, a gift]: marriage; matrimony: V. in *OE.*, to marry.

WED'DAHS, or VED'DAHS. See VEDDAH; CEYLON.

WEDDERBURN, ALEXANDER, BARON LOUGHBOROUGH and 1ST EARL OF ROSSLYN: British politician: b. Edinburgh 1733, Feb. 13; d. near Windsor, England, 1803, Jan. 2. He was educated at the University of Edinburgh, was called to the English bar in 1757, entered Parliament in 1761 as member for Ayr, and subsequently represented various constituencies. He pleaded the great Douglas case in 1768-89, and in 1771 left the ranks of the opposition to become a firm supporter of Lord North, who had appointed him solicitor-general. He strenuously opposed the claims of the American colonists, defending the policy of Lord North throughout the American war. He was made chief justice of the court of common pleas in 1780, at the same time being raised to the peerage

as Baron Loughborough, and in 1783 assisted in forming the coalition ministry, but in 1784 he joined the forces of Fox. He subsequently made friends with Pitt and gained from him the place of lord chancellor, after which he joined the supporters of George III. Upon his retirement from the chancellorship in 1801 he was created Earl of Rosslyn.

WEDDERBURN, JAMES: Scottish psalmodist: b. Dundee, Scotland, about 1500; d. England, about 1564. He studied at the University of St. Andrew, became interested in the Scottish Reformation, and fled to France to escape prosecution as a heretic. He edited, with his brothers Robert and John, the principal song book used in Scotland, *Ane Compendius Buike of Godly and Spirituall Sangs, Colleetit Out of Sundrie Partes of the Scripture, wyth Sundrie of Uther Ballates Changed Out of Prophane Sangs, for Avoyding of Sinne and Harlotrie* (about 1548). Later editions of this work have been edited by David Laing (1868) and Mitchell (1897). He is also credited with the authorship of *The Complaynt of Scotland* (1548), (the only classic work in old Scottish prose).

WEDDING ANNIVERSARIES or celebrations held as follows: The Cotton wedding, 1 year; the Paper wedding, 2 years; the Leather wedding, 3 years; the Wooden wedding, 5 years; the Woolen wedding, 7 years; the Tin wedding, 10 years; the Silk and Fine Linen wedding, 12 years; the Crystal (Glass) wedding, 15 years; the China wedding, 20 years; the Silver wedding, 25 years; the Golden wedding, 50 years; the Diamond wedding, 75 years.

WEDGE, n. *wĕj* [Dut. *wigge;* Dan. *wegge;* OHG. *weggi,* a wedge]: a piece of metal or wood, thick at one end and tapering to a thin flat edge at the other, used for rending asunder, for compressing, or for raising; one of the mechanical powers; a small bar, as a *wedge* of gold: V. to drive, as a wedge; to compress closely; to force, as a wedge forces its way; to fasten with a wedge or wedges; to cleave or split with a wedge. WEDG'Y, a. *-ĭ,* resembling a wedge. WEDG'ING, imp. WEDGED, pp. *wĕjd.* WEDGE-SHAPED, a. shaped like a wedge; cuneate.—The *Wedge* is one of the mechanical powers, and in principle is a modification of the inclined plane. The power is applied by pressure, or more usually by percussion, to the back, thus forcing the edge forward. The wedge is employed for such purposes as splitting wood, fastening firmly the handle of an ax, raising a ship in dry-dock, etc. The investigation on statical principles of the mechanical advantage of the wedge is extremely unsatisfactory—the power, which is scarcely ever a 'pressure,' being always assumed to be a pressure, and the enormous friction on the sides of the wedge being generally neglected; the theoretical result thus arrived at is that the

pressure applied at the back: the resistance or weight: ½ width of back of wedge: length of side. In the application of the wedge to splitting wood in the direction of the fibres, the split generally extends some distance in advance of the edge of the wedge, and the action of the latter is then a combination of the action of the wedge with that of the lever; in fact, this compound action is found more or less in all applications of the wedge as a cutting or splitting weapon, and tends further to complicate the statical investigation of its mechanical properties. The best and simplest illustrations of the single wedge are axes, nails, plugs, planes, chisels, needles, and all sharp-pointed instruments.

WEDGWOOD, *wĕj'wûd,* JOSIAH: creator of British pottery as an art: 1730-1795, Jan. 3; b. Burslem, in Staffordshire. His father was a potter, and very early he was set to work at the same business. His education seems to have been of the scantiest. From the first, his ardor for improvement of the manufacture was conspicuous. His first efforts were directed to the refining of the material, and soon he produced a cream-colored porcelain, which became popularly known as Queen's Ware, from Queen Charlotte, who admired it. Subsequently other improved materials were produced. Wedgwood gave not less attention to form and decoration—emulating the grace of the antique models; and the sculptor Flaxman was employed to furnish designs. Thus he raised a rude and barbarous manufacture to a fine art, and speedily amassed an immense fortune. In 1771 he removed his works a little way from Burslem; and to the new site he gave the fanciful name Etruria, as that of the country of old most celebrated for the beauty of its ceramic products. Here he built himself a splendid mansion.

Apart from his eminence in his art, Wedgwood was a man of considerable culture. He was a student of natural philosophy. He was a fellow of the Royal Society and of the Society of Antiquaries, and contributed to the *Philosophical Transactions.* He interested himself in public concerns; and he used his prosperity in a spirit of liberal beneficence.—See his Life (1865) by Llewellyn Jewett; Eliza Meteyard's *Memorials of Wedgwood* (1875); *Wedgwood Handbook* (1875).

WEDGWOOD PYROMETER: in physics, a pyrometer in which temperature is ascertained by the contraction of baked clay, measured before and after its subjection to the action of heat.

WEDGWOOD WARE: a variety of English pottery first made by Josiah Wedgwood, in which artistic designs and treatment were combined with mechanical and technical excellence. There were six distinguishing kinds of this ware, arranged in the order of their invention as follows: (1) Cream-colored ware, called Queen's

ware, in various hues of cream color, saffron, and straw. (2) Egyptian black, or basaltes ware, used for seals, plaques, life-size busts, medallion portraits, etc. (3) Red ware, or Russo antico. (4) White semi-porcelain, or fine stoneware, differing from the white jasper in its pale straw-colored or grayish hue, and in its waxlike smooth surface and subtranslucency. (5) Variegated ware, of two kinds, one a cream-colored body, marbled, mottled, or spangled with divers colors upon the surface and under the glaze; the other an improved kind of agate ware, in which the colored clays in bands, twists, stripes, and waves constituted the entire substance. (6) Jasper ware, in which the chief triumphs of Wedgwood were wrought, resembling outwardly the finest of his white terra-cotta and semi-porcelain bodies. One of his earliest recipes for this last-named ware was, in percentage, barytes, 57.1; clay, 28.6; flint, 9.5; barium carbonate, 4.8; the novelty of these components being the use of the barytes and barium carbonate. A very little cobalt was occasionally added, even to the white jasper ware, to neutralize the yellowish hue, and by introducing a little Cornish stone or other felspathic material it became less opaque and more wax-like.

There are seven colors in Wedgwood ware besides the white—blue of various shades, lilac, pink, sage-green, olive-green, yellow, and black—and it is remarkable for the absence of bubbles and holes, the flatness of the field, and the uniformity of grain. It was produced in numberless forms—cameos, intaglios, portrait medallions, statuettes, vases, etc., and the yellow variety is rare. Wedgwood's artistic work consists not only in copies of antique gems and in the adaptation of antique designs, but in the original productions of many English and foreign draughtsmen and modelers.

WEDLOCK. See under WED.

WEDNESBURY, *wĕnz'bĕr-ĭ:* market-town in s. Staffordshire, in a district abounding in canals, coal mines, and iron-works; 7½ m. n.w. of Birmingham by railway 136 m. n.w. of London. It was called Weadesbury by the Saxons, and for a long time took precedence, in population and historical importance, of Birmingham and Wolverhampton. The great coal-field of Staffordshire was first worked here. Wednesbury contains large works for manufacture of railway plant; it produces edge-tools, coach iron-mongery, locks, screws, gunlocks and barrels, gas and water pipes.—Pop. 26,540—parliamentary borough 72,478.

WEDNESDAY, n. *wĕnz'dā* [AS. *Wodnes-dæg,* Woden's day—from *Odin* or *Woden,* a Scandinavian deity, and AS. *dæg,* a day]: the day consecrated to Woden; the fourth day of the week, coming next after Tuesday.

WEE, a. *wē* [identified by Skeat with Eng. *way,* the phrase *way-bit* being still used in prov. Eng. in the sense

of *wee bit* or little bit: comp. also the old phrase 'a little *we,*' a little bit, a short space]: in *Scot.* and *prov. Eng.* little; diminutive: N. in *Scot.,* a short time, or space, as, wait a *wee.*

WEEBO, *wē'bō,* or IBO, *ē'bō:* small island off the coast of Mozambique, belonging to the Portuguese; about 150 m. s. of Cape Delgado. The town is clean, with neatly-built houses; there are three forts, adapted only for resistance to the natives, mostly a miserable fever-stricken race, between whom and the Portuguese all along the Mozambique coast there seems to be perpetual hostility. —Pop. about 3,000.

WEED, n. *wēd* [AS. *wæd,* a garment: Icel. *vad,* stuff for clothing, a vestment: OHG. *wat,* clothing, armor]: a garment of any kind; now commonly used in the plural, as in the phrase *widow's weeds,* the mourning worn by a widow.

WEED, n. *wēd:* any sudden illness arising from cold or relapse in women after confinement or during nursing. *Weed in the breast,* inflammation of the mammary glands of women during or after confinement, called also mastitis.—*Weed,* in diseases of *the horse,* is lymphangitis or inflammation of the large absorbent glands and vessels between the horse's thighs. Sometimes, but rarely, it attacks the corresponding structures between the fore-limbs. It occurs in round-limbed, indifferently bred, hard-wrought horses; appears particularly after a day or two of rest, after exposure to cold, or during imperfect action of the bowels; and is said to depend on more blood being produced than is required to replace the natural waste of the body. It may be identified by lameness, tenderness in the groin, and fever. The horse should be bled, and have a full dose of aloes; and if the pain and tenderness are great, professional advice should be taken; the limb should be bathed for at least six or eight hours continuously in hot water, and then rubbed dry and kept warm. The subsequent swelling will be reduced by saline draughts, diuretics, rubbing of the limb, and exercise.

WEED, n. *wēd* [AS. *weod,* herb, grass: Low. Ger. *weden;* Dut. *wieden,* to cleanse, as from noxious herbs]: any noxious or useless plant that is troublesome to the agriculturist, horticulturist, etc.; any person, animal, or thing that is worthless; a slang term for tobacco or a cigar: V. to free from noxious plants; to free from anything hurtful; to root out. WEED'ING, imp.: N. the operation of freeing from noxious plants. WEED'ED, pp. WEED'ER, n. *-ėr,* one who or that which weeds. WEED'LESS, a. *-lĕs,* free from weeds. WEED'Y, a. *-ĭ,* abounding with weeds; in *slang,* valueless; in *OE.,* consisting of weeds.—The name *Weed* is given to all those plants which grow wild in cultivated grounds, injuring the crops both by choking them and by exhausting the soil.

Those weeds which are annuals or biennials, as charlock, yellow rattle, and melilot, may gradually be expelled by merely cultivating, for a succession of years, such plants as are to be cut before the seeds of the weeds are ripe. Perennial weeds, such as couch-grass, can be removed from the ground by only repeated and careful tilling; and, for this purpose, crops which require much hoeing are advantageously planted; and recourse is had to summer fallowing in fields, and frequent weeding in gardens. Thistles and other large weeds are frequently pulled in corn-fields before the corn comes into ear, and to prevent their seeding, they are cut in pastures. Sedges and rushes, which spring up in great abundance in damp grounds, disappear on thorough draining. Leafy crops which thickly cover the soil prevent the growth of many weeds by exclusion of air and light. Weeds which have been rooted up form excellent compost for manure; and those which appear in fallow grounds, serve for green manuring when they are plowed down.

WEED, Stephen Hinsdale: soldier: 1834-1863, July 2; b. New York. He graduated at the New York Free Academy 1851, and at West Point 1854; and was assigned to the artillery. He served on frontier duty in Texas, against the Seminoles 1856-7, in the Kansas troubles 1858, and on the Utah expedition 1860. In 1861 he was promoted capt. and was in command of a battery in the Maryland and Virginia campaigns; 1862-3 he was chief of the artillery corps at Falmouth, Va.; he took part in the battle of Chancellorsville, and in 1863, June 6, was commissioned brig.gen. of vols. for bravery there; from 1863, May 10, he commanded an artillery brigade in the 5th corps. He was mortally wounded at the battle of Gettysburg, while holding the important position of Little Round Top, since called Weed's Hill.

WEED, Thurlow: journalist: 1797, Nov. 15—1882, Nov. 22; b. Cairo, N. Y. At the age of 10 he was cabin-boy on a sloop on the Hudson river; at 12, apprentice in Croswell's printing-office at Catskill; then lived for a short time in a backwoods settlement, but at 14 returned to printing, and was employed in several newspaper offices successively. He was a volunteer in the war of 1812. He settled in New York 1815, and was employed in a printing-office there. In 1819 he established at Norwich, N. Y., the *Agriculturist*, and 1821, at Manlius, N. Y., the *Onondaga Co. Republican;* 1824 he became owner and editor of the *Rochester* (N. Y.) *Telegraph*. During the anti-masonic excitement, Weed was elected to the state legislature 1826-7, where his peculiar and almost unrivalled abilities as a political manager were early recognized. In the meantime he retired from the *Telegraph* and founded the *Anti-Masonic Enquirer*, 1826. In 1830 he settled at Albany and began the publication of the *Evening Journal*, an anti-Jackson, whig, or republican paper, which became the organ of the party, and of the

state govt. when its party was in power. Declining all offices for himself, except the profitable one of state printer, he is supposed to have exercised almost supreme influence in nominations and appointments by the whigs, and to have secured the choice of Presidents William H. Harrison and Taylor. He was the friend and adviser of William H. Seward through his whole career. In 1861 he was sent in a semi-diplomatic capacity to Europe, and on his return was presented with the freedom of the city of New York, where he became part proprietor and one of the editors of the New York *Times*, and subsequently editor of the *Commercial Advertiser*.—See his *Autobiography*, ed. by Thurlow Weed Barnes.

WEED, Walter Harvey: American geologist: b. St. Louis, Mo., 1862, May 1. He was graduated from the Columbia School of Mines in 1883, and in that year was appointed to the United States Geological Survey, remaining till 1906. In 1883-9 he was engaged in Yellowstone Park, where his investigations proved that the colors in hot springs and deposits in geysers are due to algæ, and he also discovered Death Gulch in that park. He was occupied in a general geological exploration of Montana in 1889-98, and in 1899 published his theory of secondary enrichments of ore deposits. He was appointed commissioner and expert on copper at the Louisiana Purchase Exposition in 1904. His publications include: *Glaciation of Yellowstone Park* (1893); *Secondary Enrichment of Mineral Veins* (1899); *Copper Mines of the North* (1907); etc.

WEED'EN, William Babcock, A.M.: American manufacturer and economic and historical writer: b. Bristol, R. I., 1834, Sep. 1. He studied at Brown University, and then engaged in the manufacture of woolen goods in Providence. In 1861 he joined the Union army as 1st lieutenant of artillery; was promoted captain after the first battle of Bull Run; was present during the siege of Yorktown, and took part in the engagements at Hanover Court House, Mechanicsville, Gaines' Mill, and Malvern Hill. In Aug. 1862, he resigned and resumed business in Providence. His publications include: *Morality of Prohibitory Liquor Laws* (1875); *Social Law of Labor* (1882); *Economic and Social History of New England, 1620-1789* (1890); *War Government, Federal and State* (1906).

WEEDON, *wē'don*, George: soldier: about 1730-90; b. Fredericksburg, Va. At the outbreak of the revolutionary war he was keeping an inn at Fredericksburg, and used his opportunities for disseminating 'sedition,' as is noted in a contemporary British narrative of a tour in America. He was, 1776, Feb., lieut.col. of a Virginia regiment; was commissioned brigadier, 1777, Feb. 23, and rendered effective service in the battles of the Brandywine and Germantown. Through pique he re-

signed his commission soon afterward; but 1780 again commanded a brigade, and during the siege of Yorktown was commander of the Virginia militia at Gloucester.

WEEHAWKEN: town in Hudson co., N. J.; on the Hudson river, and on the New York, Ontario and Western and the West Shore railroads; opposite New York. It is one of the largest, if not the largest, coal depot in the United States. It has the coal docks and freight sheds of the Erie Railroad Co., and the coal docks of the Delaware and Hudson Canal Co. and the Pennsylvania Co. It has several manufacturing establishments. Two of the Hackensack Water Co. reservoirs are located here. Weehawken is known as the dueling place of Alexander Hamilton and Aaron Burr. Pop. (1910) 11,228.

WEEK, n. *wēk* [AS. *wice, wicu;* Icel. *vika;* Ger. *woche,* a week]: the space of seven days; the period beginning with Sunday and ending with Saturday. WEEK'-LY, a. *-lĭ,* pertaining to a week; happening or done once a week; done within a week: AD. once a week: N. a newspaper or journal published once a week. WEEK-DAY, any day of the week except Sunday.

WEEK: a period of seven days, one of the common divisions of time. The week is not a natural division of time, and the question when, why, and by whom it was first adopted necessarily arises in connection with its actual prevalence. The only natural explanation offered is that it has been adopted as a quarter lunation; but as there is no absolute necessity for dividing the month into four, and a large fraction is needed to make the weekly square with the lunar periods, this explanation is not satisfactory. The week is, in fact, a much closer division of a year than of a month; but the division of the year into 52 portions is so purely arbitrary that this can hardly suggest the origin of the week. The convenience of some short recurring period or cycle of days is obvious, and it is the prevalence alone, and not the occurrence of a particular cycle, that has to be accounted for. The practice of antiquity on the subject does not seem to have been so uniform as is sometimes supposed. Among the nations who adopted the week as a division of time, the Chinese, Hindus, Egyptians, Chaldæans, Jews, Persians, and Peruvians have been mentioned, but in some cases the antiquity of the practice is doubtful, and in others the name has been applied to other cycles than that of seven days. The nations with whom the weekly cycle has been traced with certainty to the greatest antiquity are the Egyptians and the Hebrews. With the former we only know of its existence, but with the latter it had a much more important character. Their earliest records speak of its existence, and refer it to a period previous to that of the nation itself. Laban, the uncle of Jacob, alludes to the week as an established measure of time in Gen. xxix. 27. The origin of the

week is further ascribed in the Jewish Scriptures to the creation of the world, and is wrought into the institutions of the nation in a variety of ways, but particularly by the consecration of the seventh day to the worship of the Creator. The Hebrew word for week is of a general signification, and applies equally to a period of seven days, seven months, and seven years, each of which had a particular celebration attached to it in the Hebrew ritual, hence the use of days to represent years in the prophetic writings is according to the natural genius of the language. The number seven had a mystic significance attached to it in the symbolism of the Jewish religion in a variety of other ways. The Romans and Greeks each divided the month into three periods (see CALENDAR), and were not acquainted with the week till a late period. The Romans, however, had for civil uses, as the arrangement of market-days, a cycle of eight days, the ninth day being the recurring one, instead of the eighth, as with us. The use of the week was introduced into the Roman Empire about the first or second century of the Christian era from Egypt, and had been recognized independently of Christianity before the Emperor Constantine confirmed it by enjoining the observance of the Christian Sabbath. The names given by the Romans to the days of the week, and which have pervaded Europe, were derived from the planetary system, which was supposed to consist of the sun, moon, and five planets, Mars, Mercury, Jupiter, Venus, and Saturn. With the Mohammedans the week has also a religious character, Friday being observed by them as a Sabbath. It is supposed by some authorities that they introduced the week to India. The Chinese week is said to consist of five days, named after the five elements, iron, wood, water, feathers, and earth. See articles on the different days of the week.

WEEKES, HENRY: English sculptor: b. Canterbury 1807; d. 1877, May 29. He was for many years the principal assistant of the sculptor Chantrey, was elected to the Academy in 1863 and became professor of sculpture there in 1873. Besides the earliest bust of Queen Victoria (1837) he executed statues of Latimer, Cranmer, Bacon, Charles II., and others.

WEEKS, EDWIN LORD: American artist: b. Boston 1849; d. Paris 1903, Nov. 17. He was a pupil of the Beaux-Arts (Paris), of Gérôme, and Bonnat, and sketched and painted in Cairo, Jerusalem, Damascus, Tangier, and other parts of the Orient, obtaining there material for the genre-scenes from eastern life with which he won his reputation. A frequent exhibitor at the Salon, he obtained honorable mention there in 1885. Among the other distinctions which he received were the diploma of honor at the Berlin international exhibition in 1891, and a special medal and prize in 1896 at the Empire of India exhibition (London). Specimens of his

work are in the Pennsylvania Academy of Fine Arts, Philadelphia, and the Corcoran Gallery of Washington. Among his paintings are: *A Cup of Coffee in the Desert; Jerusalem from the Bethany Road; Pilgrimage to the Jordan; Scene in Tangier; Arab Story-Teller* (exhibited at the Centennial Exhibition, Philadelphia, 1876); *Departure for the Hunt—India; Moorish Camel-Driver.* He also wrote *From the Black Sea through Persia and India* (1895), and *Episodes of Mountaineering* (1897).

WEEKS, Feast of (Heb. *Shabuoth*): a name employed by the Jews for the second of the great Hebraic religious festivals. It is thus called from the fact that it forms the culmination of the seven weeks succeeding the Passover feast. Primarily it appears to have been connected with the celebration of the end of the harvest, but later also with the giving of the Law on the fiftieth day after the departure from Egypt. In the New Testament it is called Pentecost, from the Greek word signifying fiftieth.

WEEL, *wēl*, or Weely, n. *wēl'ĭ* [AS. *welig*, a willow]: in *OE.*, a kind of wicker pot to catch fish in.

WEEM, n. *wēm* [Gael. *wamh*, a cave]: in *Scot.*, a natural cave; sometimes applied to an artificial cave or subterraneous building.

WEEMS, Mason Locke: American Protestant Episcopal clergyman: b. Maryland about 1760; d. Beaufort, S. C., 1825, May 23. He began the study of medicine, but gave it up and went to London, where he was educated for the clerical profession, but found no bishop in England to admit him to holy orders. There was then no Anglican bishop in America, and the professional plans of Weems were obstructed by peculiar difficulties. (For an account of them see McMaster's *History of the People of the United States*, Vol. I.) Returning to this country, he preached at different places, apparently never having a regular charge, although it has been said that the rectorship of Mount Vernon parish (there was no such parish) was held by him before the Revolution, as claimed by himself; also that he officiated in the old Pohick church, of which Washington was an attendant, which indeed he may have done, but not until long after Washington's attendance there had ceased. About 1790 he became a book agent for Mathew Carey, and traveled through the south selling works, some of which were his own. He made himself popular by exercising his talents for comedy and his skill with the violin, probably diverting and (through his sermons) exhorting the people by turns. A book of his own writing which he offered for sale was *The Drunkard's Looking Glass, Reflecting a Faithful Likeness of the Drunkard in Sundry Very Interesting Attitudes, with Lively Representations of the Many Strange Capers which He Cuts in Different Stages of His Disease* (6th ed. 1818). His *Life of Washington,*

by which he is best known, first appeared in 1800, and during the 19th century the number of its editions exceeded 70. The traditional conception of Washington rests mainly upon this work, as do the story of the cherry-tree and other anecdotes which historians reject, most of which first appeared in the 5th edition (1806). His other publications, all more or less tawdry and inaccurate, include: *Life of General Francis Marion* (1805); *The Philanthropist, or Political Peacemaker Between All Honest Men of Both Parties* (10th ed. 1809); *God's Revenge Against Gambling* (3d ed. 1816); *Life of Benjamin Franklin with Essays* (1817); *Life of William Penn* (1819); *Hymen's Recruiting Sergeant, or the New Matrimonial Tattoo for Old Bachelors* (7th ed. 1821); and *The Bad Wife's Looking Glass, or God's Revenge Against Cruelty to Husbands* (2d ed. 1823).

WEEN, v. *wēn* [Goth. *vens;* Icel. *ván,* expectation, hope: Dut. *waan,* supposition: Ger. *wähnen,* to suppose, to think]: to imagine; to think; to fancy. WEEN'ING, imp. WEENED, pp. *wēnd.*

WEENIX, JAN, THE YOUNGER: Dutch painter, son of the following: b. Amsterdam 1644; d. there 1719, Sep. 20. He painted landscapes, animals, flowers, and fruit, but excelled in the representation of dead game and hunting scenes. His pictures of this class are unrivaled by any productions of the Dutch school, and command large prices. He finished with extreme neatness, and exhibited a clear and brilliant coloring and a wonderful knowledge of chiaroscuro. Many of his works are to be seen in England and he is well represented in the galleries of the Continent.

WEENIX, JAN BAPTIST: Dutch painter: b. Amsterdam 1621; d. near Utrecht, 1660. He was instructed by Abraham Bloemart and Nicolas Mojert, and at 22 visited Rome, where he acquired a reputation by his Italian seaports and landscapes with architectural accessories. The last 12 years of his life were passed in Holland. He was a rapid painter, having been known to finish three half-length portraits with accessories in a single day, and excelled in history, portrait, animal, landscape, and marine painting, being on the whole most distinguished in the last named department.

WEEP, v. *wēp* [AS. *wépan,* to lament, to shed tears—from *wóp,* an outcry: Goth. *vopjan,* to call, to cry: Icel. *æpa,* to shout, to cry]: to shed tears; to lament with tears; to express grief or anguish by tears; to spend or waste in tears; in *OE.,* to lament; to complain; to shed moisture. WEEP'ING, imp: ADJ. lamenting; shedding tears; dropping; drooping: N. act of one who weeps; lamentation. WEPT, pt. pp. *wĕpt.* WEEP'ER, n. *-ėr,* one who weeps; a white linen or muslin cuff on a black coat, worn in Great Britain as a sign of mourning. WEEP'INGLY, ad. *-lĭ.* WEEPING-BIRCH, a tree of the birch kind

with drooping branches. WEEPING-WILLOW, a species of willow with long slender branches which droop or hang down. See WILLOW.

WEEPING CROSS: a cross of stone or wood, erected at the side of a road, at which penitents prayed and wept for their sins. Hence the old English saying, 'To return by weeping cross,' that is, to return in sorrow from some message or undertaking. As these crosses were removed in England when that country became Protestant the saying is now obsolete, but is met with in old writers.

WEEP'ING-TREES: trees with remarkably elongated and pendulous branchlets, generally mere varieties of species which ordinarily have a different habit; as the Weeping Birch, Weeping Ash, and Weeping Willow, varieties of the Common Birch, Common Ash, and White or Huntingdon Willow. Trees intermediate in their habit between the Weeping Birch and the common variety are very frequent. Weeping-trees are much esteemed for ornamental purposes, as not only beautiful in themselves, but also as a contrast to other trees in lawns and pleasure-grounds. They are therefore carefully propagated in nurseries. The Weeping Ash is often grafted on the Common Ash, but the result is seldom satisfactory, the art of the gardener forcing itself too much upon attention. A tendency to the weeping habit of elongated and pendulous branchlets is manifested in some kinds of trees; as the tendency to vary into a very opposite habit, with the branchlets drawn up close together (var. *stricta* of botanists), appears in others, of which the Swedish Juniper and the Irish Yew are familiar examples.

WEERISH, a. *wēr'ĭsh* [see WERSH]: in *OE.*, insipid; weak and washy; crabbed; surly.

WEERT, *wārt:* unwalled town in the Netherlands, province of Limburg; 12 m. w.n.w. of Roermond, on the ship-canal from Maastricht to Hertogenbosch. There are several good schools, a collegiate institution, townhouse, two churches, and three market-places. In the Church of St. Martin is the grave of the Count of Hoorn, beheaded at Brussels 1568, for adhering to the Prince of Orange in the struggle for religious and political freedom. A beautiful promenade leads to the other church, outside the town, n. of which are the ruins of the old castle. Besides the markets for farm produce, horses, and pigs, Weert has factories for making cloth, stockings, and hats, corn and oil mills. Here was born, 1594, Jan van Weert, who, in boyhood a shoemaker's apprentice, became commander of the Austrian army and viceroy of Bohemia.—Pop. 7,477.

WEET, v. *wēt* [AS. *witan*, to know: Goth. *vitan*, to look]: in *OE.*, to know. WEET'LESS, *a. -lĕs*, in *OE.*, unknowing. WEET'INGLY, ad. in *OE.*, wittingly.

WEEVER: (variant of weaver, or of the obs. *wiver*, from Lat. *vipera*, viper), a fish of the genus *Trachinus*, two species of which are recognized: *T. vipera*, 5 to 6 inches in length, and *T. draco*, 10 to 12 inches. These fishes possess sharp opercular and dorsal spines, with which they can inflict a painful wound. The sting is believed not to be poisonous, but it is very similar to that of the sting-ray.

WEEVIL, n. *wē'vl* [AS. *wibba, wifel*, a beetle: O. Dut. *wevel;* Ger. *wiebel*, a weevil: allied to the root of Ger. *weben*, to move, float]: an insect of the beetle tribe, exceedingly destructive to grain in granaries, and to growing timber. WEE'VILLED, a. *-vĭld*, or WEE'VILY, a. *-vl-ĭ*, infested with weevils.—The name *Weevil* is applied to any of the insects called snout-beetles, of the order *Coleoptera*, formerly included among the *Rhynchophora*, but now placed in the families *Bruchidæ* and *Curculionidæ*. The term weevil is improperly applied to a small fly that infests the ear of growing wheat. The true grain weevil is a minute beetle that eats stored grain. Of the weevils proper, family *Bruchidæ*, are those that eat into the seeds of beans and peas. Of the *Curculionidæ*, are the plum-weevils, called Little Turk, and numerous other species, respectively infesting apples, grapes, strawberry-plants, potato-stalks, various nuts, etc. They are characterized by prolongation of the head into a beak or snout, at whose extremity is the mouth, and from which the club-shaped antennæ spring. Some have straight antennæ; but the greater number have the antennæ *geniculated*, or bent forward at the second joint. The species are very numerous (400 species, described, of 100 genera, in the United States), and are distributed over all parts of the world. They all feed on vegetable food, both in their larval and in their perfect state; and some are notable for the mischief which they do in the larval state to the young shoots, leaves, fruits, and seeds of the plants. They are diurnal insects, many very small, others of considerable size. They are slow, timid, and defenseless; and some that infest fruit-trees are easily jarred off into sheets spread on the ground, where they simulate death, and may be gathered up and destroyed; or, early in the morning, may be collected from beneath chips and boards, placed on the ground for their night-shelter under the fruit-trees. Many are of very dull and uniform color; but some are among the most beautiful of the Coleoptera—resplendent with finest hues, and brilliant as gems: of such is the well-known Diamond Beetle of South America. The larvæ of weevils are soft, white, and footless, with very convex rings, hard heads, and horny jaws. The perfect insects are often found on leaves and in flowers of the particular kinds of plants on which they and their larvæ feed. *Rhynchites botuleti*, a weevil often very injurious to vineyards, constructs a nest for its larvæ by rolling

up the leaf of the vine, piercing the roll as it proceeds, and depositing eggs between the folds in the inner part of the roll. The larvæ feed on the leaf, which the parents further adapt for their use by cutting the leaf-stalk half through, so that the leaf hangs down; and by the time they are ready to change into the chrysalis state it drops off, or is blown off by the wind, when they bury themselves in the ground to wait for the return of spring. Other trees, e.g., the pear-tree, are infested by weevils which destroy their leaves in a similar manner; the leaves of some, as of the peach, often suffer injury from weevils which devour them, like caterpillars, without rolling them up; and turnips are subject to the ravages of certain small species of weevil, which proceed in the same manner. The shoots of fruit-trees, and young grafts, are sometimes destroyed by weevils, which bore into them by means of their beak, and make a small chamber in the centre, in which an egg is deposited, being pushed into its proper place by the beak. The shoot is then cut through a little lower down, and the parent weevil may be seen climbing upon it, when the operation is nearly completed, to make it fall by her weight, and returning again to her work if it is not yet ready to fall. She lays about two eggs a day, but continues her operations for many weeks, so that much destruction is effected. The larva feeds on the pith of the fallen shoot, and deserts it when ready to become a chrysalis, to bury itself in the ground.—The larva of a large species of weevil (*Calandra palmarum*) inhabits palm-trees in South America, feeding on their central part. Another species (*Calandra sacchari*) is very destructive to sugar-cane: its larva also is eaten in the West Indies and Guiana.—The wood of pines and firs is the food of certain kinds of weevil, so that plantations suffer severely from their ravages. Thousands of acres of pines in the southern states have been destroyed by a weevil (*Hylobius pales*) not much more than a quarter of an inch in length; and some of its congeners in other countries are scarcely less destructive, as *Hylobius abietis* in Europe.—There are many special of weevil which attack leaf-buds and flower-buds. Thus, *Anthonomus pomorum* infests the apple-tree, depositing its eggs in the flower-buds, and cutting off the prospect of fruit. *Anthonomus pyri* is equally injurious to the buds of pear-trees. Some species of *Rhynchites* lay their eggs in fruits—as apples and plums—at an early stage of their growth, cutting the fruit-stalk that the fruit may fall to the ground. The European Nut Weevil (*Balaninus nucum*) lays its eggs in young hazel-nuts, on which the larvæ feed as the nut grows; a nearly allied species attacks, in like manner, the hazel-nuts of America, and another infests acorns. The Pea Weevil feeds on peas; and other leguminous plants have their peculiar species, which devour their seeds.

WEIGELIA, *wī-jē'lĭ-a*, or WEIGE'LA, *-la:* shrub of nat. order *Caprifoliaceæ* or Honeysuckle family; introduced into England from China and Japan by Robert Fortune 1843, and named after the German botanist Weigel. It has since been found nearly identical with, though more showy than, the plant Diervilla, named from a French surgeon, Dierville, who carried it from Canada to the French botanist Tournefort in the early part of the 18th c. Diervilla is therefore the botanical name, though under cultivation it is popularly known as Weigelia. In the U. S. there are two species, northern and southern, known as bush honeysuckle, but differing from the true honeysuckles in having more slender calyx lobes, a more regular corolla; and the fruit, which in the honeysuckle is a berry, in W. is a many-seeded two-valved pod. The n. species, *Diervilla irifida*, has petioled leaves, and pale honey-colored flowers, usually three on a stalk, from the axils of the upper leaves. The s. species, *Diervilla sessilifolia*, has sessile leaves and several flowers on a stalk.

WEIGH, v. *wā* [Ger. *wiegen*, to move to and fro; *wägen* to weigh: Dut. *waggelen*, to waggle: Icel. *vega*, to move, lift, weigh: Dan. *veie;* Sw. *väga*, to weigh: AS. *wegan*, to lift, to weigh: the act of *weighing* taking its name from the *wagging* movement of the beam up and down]: to raise; to lift, as an anchor; to lift or bear up in order to ascertain the weight of (a thing) as compared with a fixed standard; to have weight; to be equivalent to in weight, as, it *weighs* a pound; to sink, as by its own weight; to overburden; to ascertain the heaviness of by actual trial; to ponder in the mind; to be considered as important; to bear or press heavily, as on the mind; to depress; in *OE.*, to consider as worthy of notice; to regard. WEIGH'ING, imp.: N. the act of ascertaining the relative weight of a thing; the act of balancing in the mind. WEIGHED, pp. *wād.* WEIGHER, n. *wā'ẽr*, one who or that which weighs; one who examines and tries weights. WEIGH'ABLE, a. *-ă-bl*, that may be weighed. WEIGH'AGE, n. *-āj*, the cost or rate of weighing. WEIGHT, n. *wāt*, the heaviness of a body ascertained in a balance with a fixed standard; a mass, as a standard for weighing; gravity; something heavy; pressure; overwhelming power; importance; consequence: moment. V. to attach weights or add additional weight to. WEIGHT'Y, a. *-ĭ*, heavy; ponderous; momentous; important; efficacious; onerous; adapted to turn the balance in the mind; adapted to convince; in *OE.*, rigorous; severe. WEIGHT'ILY, ad. *-lĭ.* WEIGHT'INESS, n. *-nĕs*, heaviness; solidity; power of convincing; importance. To WEIGH ANCHOR, to lift it from the sea-bottom to permit the ship to sail. To WEIGH DOWN, to press or bear down; to oppress with weight. WEIGH-HOUSE, or WEIGHING-HOUSE, a building for testing the weight of goods. WEIGH-BRIDGE, a weighing-machine for weighing loaded carts and wagons.—SYN. of 'weight': mass; burden; load; power; influence; efficacy; consequence; pressure; ponderousness; heaviness; impressiveness.

WEIGH'ING-MACHINE: a contrivance for ascertaining the weight of bodies. *Weighing-machines* are of various forms, according to the quantity and nature of the article whose weight is to be determined. The great majority of weighing-machines are on the principle of the Lever (q.v.), the chief exceptions being the Spring-balance (q.v.), to which might be added (though in such cases the term 'machine' is inapplicable) some of the methods employed to determine specific gravity, time of oscillation, etc. The simplest and primitive

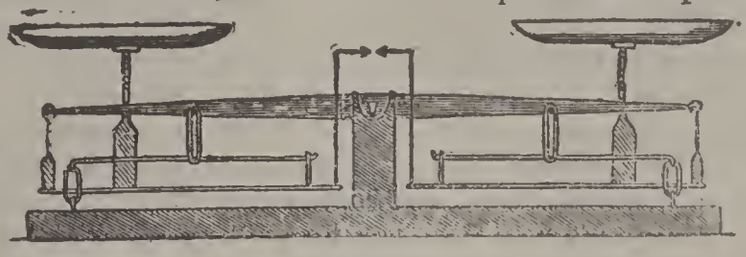

Fig. 1.

form of weighing-machine is the Balance (q.v.) with equal arms, which can be adapted either to the maximum of accurate weighing or to the most rapid equiponderance. But as this machine necessitates the *placing* in one scale of weights equal to the weight of the goods, it was soon found more convenient to employ a lever with unequal arms—the goods to be placed in the scale attached to the short arm, and therefore equipoised by less weights—the ratio of the weights in the two scales being in proportion to the ratio of length of the arms: on this principle the *steelyard* (see BALANCE), the *bent lever balance* (see BALANCE), and the *cart-steelyard* are constructed. But the convenience

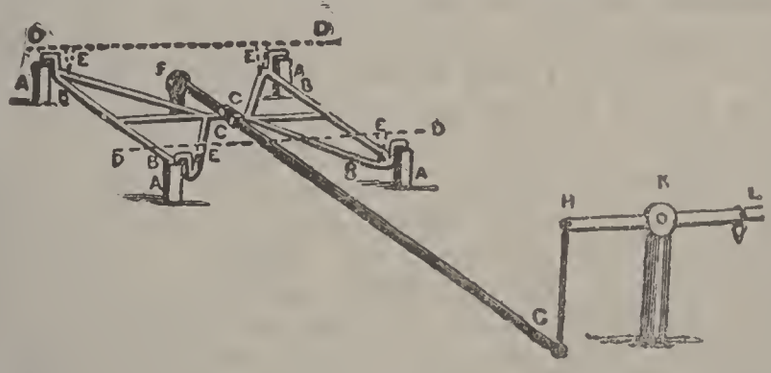

Fig. 2.

of equipoising a greater weight by one much less is counterbalanced by considerable diminution in accuracy—one of the causes of error being the greater liability to flexure of the longer arm of the lever; and another, the necessity, for convenience, of having the arm which is affected by the goods to be weighed made as short as possible—the latter of itself reducing the accuracy of the steelyard to that of a symmetrical balance whose arms are each equal to the short arm of the steelyard. However, on behalf of the steelyard, there is again the advantage of rapid equipoise. Each of these machines is variously constructed, the modifications having reference either to

convenience of use or to the species or weight of the goods to be weighed: an example of the former is the equal-armed balance (fig. 1), made in an inverted manner, with the scales above, and the rods which connect the scales with the beam so united as to preserve their perpendicularity during oscillation; and the latter is appropriately illustrated by the form of cart-steelyard given in fig. 2. The dotted lines, DD, DD, indicate the grooved plates on which the wheels rest; E, E, E, E, are the four points supporting the wheel-plates on the two triangular levers, CBB, CBB; the triangular levers are supported by the hooked extremities of their bases, B, B, B, B, upon fixed supports, A, A, A, A; while their vetrices, C, C, are attached to a lever, FG, whose fulcrum is at F; G is attached by a chain to H, the extremity of a lever of the first kind, whose fixed support is at K, and on whose other arm (graduated) the weights for equipoising the cart and its load are placed. The machine is thus seen to be compound, consisting of the two triangular lever pieces, of a simple lever of the second, and of one of the first kind; the weight L, if sufficient, raising H, and with it G, and thence raising C, and so balancing the downward pressure of the cart and its load at E, E, E, E. Various other forms of the cart-steelyard are in use. The majority of the machines of large capacity used for weighing heavy loads such as carts loaded with grain, hay, coal, building materials, etc., operate on the principle of the lever, and belong to the class designated as unequal-armed balances. They are also known as 'decimal balances,' and as usually arranged, the ratio between the small known weight on the weighing beam and the unknown weight on the platform or bridge, is indicated in multiples of ten. Cattle scales are capable of weighing from 10 to 200 head of cattle at a single operation, and the capacity of grain scales ranges upward of 500 bushels, while the large iron and steel manufacturing plants and gun shops, employ machines with capacities exceeding 100,000 pounds. The machine at Watervliet arsenal, Troy, N. Y., used for weighing guns, has a capacity of 300,000 pounds. Continuous weighing machines are employed to weigh automatically, material carried by conveyors, picking bands, etc., without interfering with the travel of the bands, and without requiring the tipping of the material, such as grain, sugar, coal, etc., into a weighing hopper and back again, with the attendant amount of breakage or loss, and the annoyance of dust. The principle upon which they operate is applicable to tramways.

Bibliography.—For further information consult W. Airy, *Weighing Machines*, London Institute of Civil Engineers, 1892; *Continuous Weighing Machines*, in *Engineering*, London, Vol. 72, pp. 482-483, and the various engineering magazines.

WEIGHTS AND MEASURES.

WEIGHTS AND MEASURES: the systems of units by which the weight, length, breadth, extent, capacity, or volume of bodies is determined. For the proper carrying on of mercantile transactions, and for many other purposes, it is necessary that there be fixed and readily accessible standards of magnitude, of weight, and of value. The lengths implied by the names *a foot, a hand, a cubit, a fathom,* are far too indefinite to have long continued to satisfy the wants of civilized nations; and in every country, by common consent, or by the action of government, determinate measures have been agreed on. These measures, left almost to chance, have been different from one nation to another, even from county to county, sometimes from town to town; and, still more awkwardly, often from one trade or guild to another.

Any one can appreciate the inconvenience of such a want of uniformity, if, in every transaction extending beyond his own sphere, he has to take account of the change of measure, the change of weight, the change of money, perhaps of all three at once. We all see and allow that there ought to be only one system of weights and measures in one country: it is easy to extend our observation, and perceive that, if one system be advisable for one country, a universal cosmopolitan system would be no less advantageous for the whole world.

The only practicable method of establishing a system of measures is to construct standards of reference, and to preserve these carefully in some public place. That these standards may not be worn and injured by too frequent use, it is convenient to have authenticated copies deposited in various towns, so that all dealers and artificers may have ready access to them, and so that all makers of weights and measures may be without excuse for errors in their workmanship.

To set up a standard of measure seems a very simple matter—the authorities have only to fix on the proper length of a yard, to have a piece of wood or of metal made to that length, and to cause it to be properly marked and preserved. For common purposes this seems enough: however, experience soon shows the inadequacy of this simple plan; for by repeated contacts the ends of the yard-measure become worn. Instead, therefore, of making a rod just a yard long, they make it a little longer, and on it form two fine marks a yard distant from each other, and hold this distance to be the true standard. By this expedient the effects of wearing are avoided; copy after copy can be compared with the original, without deterioration of the standard.

But use is not the only cause of deterioration: wood decays or is worm-eaten, and metals are liable to oxidation so that the material has to be carefully chosen. This is not all: every substance which has been examined is found to change its size with change of temperature; the standard bar is shorter in winter than in summer; and the change, though so small as to be of no moment to the cloth-seller, the carpenter, or the mason, is enough to cause

great trouble to those engaged in very accurate work. Hence, in selecting the substance for the standard bar, we must have an eye to smallness of expansion as well as to durability. The substances available, in the order of their expansibility, are: *pine* or *fir*, *glass*, *platinum*, *gold*, *silver*, *iron*, *brass*, *copper*. Pine may be put aside as lacking durability, and the choice may be said to lie between glass and platinum, neither of which is much acted on by the air, or by the vapors in the atmosphere of large towns. The fragility of glass and the costliness of platinum have been objections; but expense is a trifle when a national standard is concerned. Platinum, then, seems the best substance.

The standard measure for the Brit. empire is a brass rod, into which two pins of gold are inserted; the upper surfaces of these are sunk to the half thickness of the bar, and a small dot is made in the middle of each. The distance between the centres of these dots, taken when the temperature is at 62° F., is declared to be the true yard.

In the same way as the standard of measure, so must the standard of weight be established. A piece of heavy metal is made of the desired weight, and is duly authenticated. The preservation of the standard of weight is difficult. Every occasion on which it is used, each removal of dust from its surface, the actions of the oxygen of the air and of the products of combustion always floating about, produce a sure though slow waste; and all that can be done is to retard this waste as much as possible. Perhaps a lump of platinum would make the best standard; but its softness is a decided objection.

In the use of a standard of weight, another matter has to be taken into consideration. The apparent weight of any substance is less than its true weight by the weight of as much air as is displaced by it. Now, the density of the air is not constant—air, when warmed, expands very much more than any solid body; and therefore a piece of metal appears to weigh more in warm than in cold weather. Moreover, air is rendered more dense by increase of pressure; so, when the barometer is high, all heavy bodies become apparently lighter; when the barometer sinks, they appear to become heavier. Thus the apparent weight of the standard pound is continually changing. If we accurately adjust two weights of brass when the barometer is low and the air warm, and afterward compare them when the barometer is high and the weather cold, we can perceive no change, for, though each has lost weight, they have lost alike. But if we had adjusted a weight of iron to a weight of platinum in light air, and again compared them in dense air, the change would have been at once seen; for, since a pound of iron is more bulky than a pound of platinum, it displaces more air, and its apparent weight undergoes a greater change than does that of the platinum. Fortunately these changes are too small to have perceptible influence on mercantile transactions; yet they are sufficient to create the necessity for an enactment that the standard weight must be held as true when the air is in a specified

state as to warmth and pressure. Until 1878 the standard brass pound, which served for the British empire, was to be used when Fahrenheit's thermometer was at 62° and the barometer was at 30 inches. But a new act, 1878, while making no material change so far as mercantile matters are concerned, placed the system on another and most unsatisfactory foundation. The standard of length is still the distance between the same two gold pins, but the standard of weight is declared to be a platinum pound avoirdupois to be weighed *in vacuo*. The act contains no instructions as to how this is to be compared with any weight in air, nor does it narrate any connection between the brass weight of 5,760 grains in air with the platinum one of 7,000 grains *in vacuo*. Further, the whole of the old act is repealed, so that there is now no connection between the standards of measure and of weight, nor between these and any natural or recognizable quantity.

The W. and M. used in the Brit. colonies in America were those of the mother country, but in time departed more or less from the Brit. standards; and the W. and M. of the several colonies also varied more or less among themselves. The federal congress, 1817, commissioned John Quincy Adams to investigate the subject, and he had an examination made of the standards used in all the custom-houses: his report (1821) showed that considerable differences existed between the standards of one state and of another, and even between the standards of different custom-houses in the same state. But Adams expressly declined to recommend the adoption of the French metrical system, because of its un-English terms, its disturbance of things as they were, and the inconvenience of the decimal system. Congress (1828, May 19) by law declared the brass troy pound, copied from the official Brit. standard, the standard troy pound of the U. S. mint. A revision of the standards was made by Prof. Hassler 1830, under authority of an act of congress; and accurate copies of the standard of W. and M. were supplied to every custom-house; and (1836) the sec. of the treasury was directed to deposit at the seat of govt. of each state a complete set of copies of all the authorized standards—viz., besides the copy of the standard troy pound, copies of the standard yard, avoirdupois pound (7,000 grains), and gallon (231 cubic in., 58,372·2 grains of distilled water at greatest density). Congress legalized the metric system of W. and M. 1866, as did the Brit. parliament 1864; but in neither country is that system made obligatory; and even the standards of pound, gallon, yard, etc., are not obligatory in the several states except by state legislation.

Time was when a seed of wheat gathered from a well-ripened ear served sufficiently well to define a grain weight; and even now the Eastern jewellers weigh their gems against the *carat* or carob-bean, whose hardness and uniformity seem to justify the selection of it. But for the extended purposes of modern commerce, and particularly for the delicate requirements of scientific research, it is indispensable that we find some unchanging object of compari-

son; and none can be preferred to the earth itself as the most universally acceptable and as the best defined. For the purposes of geographers and navigators the circumference of the earth is divided into degrees and minutes, the length of one minute being the geographical or nautical mile; and it certainly would have been convenient if the common or statute mile had agreed with this. The dimensions of the earth are now known with a precision far greater than is needed for ordinary purposes—the entire length of the circumference of a meridian circle being 131,236,000 of our standard ft., so that the length of a nautical mile is 6,075 ft. and about 9 inches; and it is highly probable that subsequent and more accurate measurements will not alter this determination more than an inch or two either way. It is usual to divide the minute into 60 seconds, so that a second of the earth's circumference is 101.25; and thus if our standard foot had happened to be one-eightieth part longer than it is, there would have been exactly 100 ft. in a second and 6,000 ft. in a nautical mile.

The ancient Greeks were fond of dividing into sixties; this division continues in our scales for angles and for time; and it is worthy of remark that if we divide the whole circumference of the earth into 60 parts, each of these into 60, and again each into 60, we arrive at a distance of 607.5 Eng. ft. Now, the length of the ancient Greek stadium or furlong is by some writers stated at 606¼ ft., and if deduced from measures of the Roman mile is between 605 and 613 ft.; so that if we desire a cosmopolitan standard we can hardly do better than go back to the ancient Greek *stadium* or the Chinese *li*, slightly corrected to suit the more accurate determination of modern times: this would bring us to the geographical foot, one-hundredth part of a second of the earth's meridian.

The standard of weight is readily connected with the standard of measure. Some substance which can be easily obtained pure is chosen, and a definite bulk of it is weighed. Distilled water is universally selected for this purpose; and in the British system the weight of one cubic inch of pure water is declared to be 252.458 grains when it is at the temperature of 62° F.

It has long been known that water does not continue to contract as it is cooled; the contraction becomes less and less as the temperature approaches to 41° or 39° F.; and the water, when cooled more, begins to expand, and continues to grow more bulky until it comes to the point of freezing. On this account it has been proposed—and without any doubt it would be the best plan—to take water when at its greatest destiny as the standard for comparison, because then an error of a degree in temperature will produce no perceptible error in the weight.

The operation of verifying the standard of measure by comparing it with the size of the earth is necessarily expen-

sive and complicated to be attempted only under the auspices of a wealthy government, or with concurrence of several nations; and it is desirable to find something more local and more easily obtained wherewith to compare our measures. The length of the Pendulum (q.v.) has been proposed; and, on account of a very simple and beautiful property of pendulums, the comparison can be readily made. If we imagine an excessively minute heavy body to be suspended by a thread so fine that the weight of the thread may be neglected, the compound so formed is called a simple pendulum; and the question becomes, what must be the length of such a pendulum in order that it may vibrate from side to side in, say, one second of time. Now, it is clear that we cannot obtain this length by direct experiment, since we cannot construct such a pendulum. Biot tried to approximate to it by using a small ball of platinum hung by a very fine wire. However, it is known that if a heavy rigid mass, AB, be suspended by a knife-edge C, and if its vibrations be made in the same time with those of a simple pendulum of which the length is CD, then if we place another knife-edge at D, and reverse the ends A, B, the compound pendulum will again vibrate in the same time as before. Hence we have a very simple method of comparison. Having constructed a strong bar with two knife-edges at a known distance from each other, say at the distance of a yard, let us then by many trials, filings, and scrapings so adjust it that the times of vibration shall be alike for the two knife-edges; and, finally, let us count how many vibrations such a pendulum makes per day, and then we shall have a means of verifying our measure.

The act of parliament which fixes the present Brit. weights and measures, enacts that the length of a pendulum vibrating in one second of mean solar time is 39·13929 inches: now, the lengths of pendulums are proportional, not to the times in which they vibrate, but to the squares of those times; and so, if we know the length of one pendulum, and the number of vibrations it makes per day, we can calculate what ought to be the length of another to vibrate a given number of times. A convertible pendulum having the distance between its knife-edges exactly 36 inches ought to make 90088·42 vibrations per day.

When only a degree of accuracy sufficient for commercial and ordinary purposes is aimed at, the above process is not difficult; but when extreme precision is wanted, the operation is attended with many very great difficulties: it involves considerations which would hardly have been expected. In the first place, our experiments are made in air, and the buoyancy of the air lessens the actual weight of the pendulum; that buoyancy has to be allowed for, and therefore it is declared that the above length is that of a pendulum vibrating in a vacuum. Next, since the earth has a diurnal motion on its axis, every substance placed

on it has a centrifugal tendency which goes to modify what otherwise would have been its gravitation; this centrifugal tendency produces the earth's oblateness, and causes a variation in the intensity of gravitation from one latitude to another. A stone is actually heavier in Albany than it is in Baltimore. This change in gravitation cannot be measured by a balance, because the weights at each end of the balance are changed alike; but it is seen at once in the going of a clock; for a pendulum regulated to go truly in New York is found to go too fast when taken to a higher latitude, and to lose time when carried nearer to the equator—hence the British enactment that the pendulum must be swung in the latitude of London. Again, the attraction which the earth exerts on bodies placed near it diminishes with their distances, being inversely as the squares of the distances; hence a clock carried from the bottom to the top of a hill loses time perceptibly; so it is necessary to have the additional enactment that the pendulum be swung at the level of the sea.

In addition to these niceties, there are others connected with the manipulation, such as the parallelism of the knife-edges, their bluntness, the extent of the area of oscillation, and the stability of the supports, so that altogether the exact measurement of the length of the seconds pendulum is a matter of very great complexity. Notwithstanding, the systems of weights and measures of all civilized nations suffice for all ordinary purposes, whether those systems be regarded as derived from the dimensions of the earth or from the intensity of gravitation.

No system of measures from which geographical dimensions are excluded can ever claim to be of universal application. It is essential that the unit of measure bear some simple relation to the earth's circumference; for otherwise the operations of the surveyor will not accord with those of the geographer. The only question, therefore, in regard to the establishment of a cosmopolitan system, is as to the number of parts into which the earth's circumference is to be divided. Now, the denary system of numeration has already asserted its supremacy; one by one the schemes followed by different nations have given way to it, and their very languages have been modified by its influence; sufficient traces remain to show how extensive these modifications must have been. The *three-score and ten* is not yet forgotten in English, nor the *quatre-vingt dix neuf* in French. In many trades the counting is still in dozens and grosses; yet merchants count their interest, their discount, and their dividends in cents. The surveyor divides the foot on his levelling-staff into tenths, hundredths, and thousandths; he makes his Gunter-chain of 100 links. The astronomer no longer divides the second into 60 thirds, but into hundredths; he gives his equinoctial time in decimal fractions of the day, and he makes the arguments for the planetary disturbances in thousandth parts of the whole revolution. There is no single instance in which the decimal system, once adopted, has been abandoned. See DECIMAL SYSTEM.

WEI-HAI-WEI, *wā′hī′wā′*, China: a seaport and British naval and coaling station, in the province of Shantung, near the e. extremity of the Shantung peninsula, 40 m. e. of Chee-foo. It lies on the s. shore of the entrance to the Gulf of Pe-chi-li, opposite Port Arthur on the n. shore, about 100 m. distant. During the Chino-Japanese war, the Japanese destroyed a Chinese fleet here and captured the town, which they evacuated early in 1898. By a convention of 1898, July 1, the port of Wei-hai-wei, together with the adjacent waters and some neighboring territory, was leased to Great Britain. The leased territory includes the island of Liu Kung, all the islands in the bay, and a belt of land 10 m. wide along the whole coast of the bay; area, 280 sq.m.; pop. 120,000. By the terms of the lease Great Britain has sold jurisdiction within the limits of this territory, but within the walls of the city Chinese officials may exercise such authority as is not inconsistent with the defense of the territory. The British government may also erect fortifications and carry out other defensive works in a defined region lying outside of the leased territory. Chinese war-vessels retain the right to use the waters. Wei-hai-wei is not to be fortified, but is intended to be a naval base, place of exercise, and sanatorium for the British squadron on the China station.

WEIMAR, town of Germany, capital of the grand duchy of Saxe-Weimar-Eisenbach, and residence of the grand duke; 50 m. s.w. of Leipzig by railway, 136 m. s.w. of Berlin. It is in a pleasant valley on the left bank of the Ilm; but the environs are not remarkable, and the town itself is irregularly and plainly built. Though the residence of the court, and finding its subsistence in providing for the wants of distinguished visitors, Weimar has neither trade nor manufactures. This dull, provincial-looking town received a literary lustre by the residence here, at the close of the 18th and the earlier portion of the 19th c., of Goethe (q.v.), Schiller, Herder, and Wieland, at the court of Karl-August; and the monuments, traditions, and associations of that group give Weimar all its present interest. The town church (*Stadtkirche*), dating from 1400, has an altar-piece by Cranach, and contains memorable tombs, among which are those of the brilliant soldier Bernhard of Weimar and of Herder, philosopher and critic. The ducal palace is a handsome building, some of whose apartments are decorated by frescoes illustrating the works of Goethe, Schiller, Herder, and Wieland. The public library contains busts of these men of genius; and a number of relics, as the gown worn by Luther when a monk; and Gustavus Adophus's leather belt pierced by the bullet that caused his death at Lützen. The houses of Goethe, Schiller, and Herder are still pointed out. The two former of these poets lie in-

terred in the grand-ducal burial-vault. The park and gardens of the place, within which is shown the summer residence of Goethe, are a pleasant promenade. Pop. (1900) 28,489.

WEINGARTNER, Felix: Austrian composer: b. Zara, Dalmatia, 1863, June 2. He studied at the Leipsic conservatory, having received a government scholarship, and in 1884 his opera, *Sakuntala*, was brought out at Weimar under the patronage of Liszt. He was musical conductor at Königsburg, Dantzic, and Hamburg in 1884-9, and in 1891 was appointed court conductor at Berlin. Ill health compelled the resignation of this post, and in 1898 he settled in Munich as conductor of the Kaim concerts. He has composed numerous songs, several symphonic poems, the operas: *Malawika* (1886); *Genesius* (1892); etc. He has written: *Die Lehre von der Wiedergeburt und das Musikalische* (1895); and *Beyreuth 1876 bis 1896* (1897).

WEIR, *wēr*, Harrison William, English artist and journalist: b. Lewes, Sussex, 1824, May 5; d. London, 1906, Jan. 4. He learned the art of wood-engraving, but disliking it, turned to painting, and his first exhibition at the British Institution was in 1843. He was the last survivor of the original staff of the London *News* and was engaged on the *Graphic, Pictorial Times, Black and White,* and other London periodicals. He was an authority on the correct delineation of domesticated animals, was noted for his paintings of country life, and as an illustrator of books and periodicals. He wrote and illustrated: *The Poetry of Nature; Every-day Life in the Country; Our Cats and All About Them;* etc. Perhaps his greatest achievement was his work *Our Poultry and All About Them* (1903), the writing and illustrating of which claimed his attention for more than 20 years.

WEIR, John Ferguson, American painter and sculptor, son of R. W. Weir; b. West Point, N. Y., 1841, Aug. 28. He was a pupil of his father and became a member of the National Academy in 1866. Since 1869 he has been professor of painting in the Yale School of Fine Arts. As a sculptor he is known by his statues of President Woolsey and Prof. Silliman of Yale, and in addition to many portraits he has painted *The Gun Foundry; The Forging of the Shaft; The Column of St. Mark's, Venice; etc.*

WEIR, Julian Alden: American artist, son of R. W. Weir; b. West Point, N.Y., 1852, Aug. 30. He studied with his father, and at Paris, with Gérôme, became a member of the Society of American Artists in 1877 and a National Academician in 1886. He has made a specialty of portraits and genre, his *Idle Hours,* now in the Metropolitan Museum, New York, receiving the $2,000 prize of the American Art Association, and his *Breton Interior* obtaining a second class medal at the Paris Exposition of

1889. About 1887 he abandoned his former grave manner and has since been known as one of the Impressionist school.

WEIR, Rbert Walter: artist painter: 1803, June 18 —1889, May 1; b. New Rochelle, N. Y. At the age of 19 he began the study of painting under John Wesley Jarvis; went to Florence, Italy, 1824, and there executed his *Christ and Nicodemus,* and *Angel Visiting Peter.* He spent the year 1825-6 in Rome. Weir became prof. of drawing at West Point 1832, and held the professorship 42 years. He executed a great many historical paintings of distinguished merit. Among his best-known works are (besides the two named above): *Belle of the Carnival* (1836); *Bourbon's Last March,* and *Landing of Henry Hudson* (1842); *Indian Captive,* and *Taking the Veil,* and a *Church* (1847); *Embarkation of the Pilgrims* (1845); *Evening of the Crucifixion* (1867); *Christ in the Garden* (1873); *Columbus before the Council of Salamanca* (1884).

WEIR, or Wear, *wēr;* called also a Dam: a structure across a stream, for the purpose of diverting the water into a mill-lade, of raising its level to increase its depth for navigation, or of providing the means of catching fish. There is also the waste-weir, for the purpose of preventing a reservoir embankment being overtopped by floods; and the gauge-weir, for the purpose of computing the quantity of water flowing over it, from a measurement of the difference of level between the crest of the

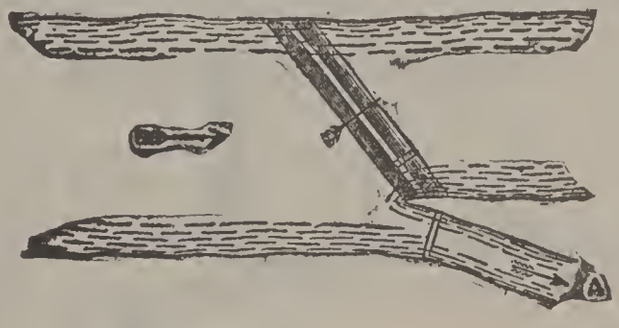

Fig. 1.
A, intake.

weir and the surface of the still water above it. The word is used sometimes, though perhaps not quite correctly, to denote a training-wall or other structure paralleled with the general line of a river, for remedying or preventing loops or sinuosities. A weir may—according to its purpose or materials—be formed of stone, timber, or brushwood, or a combination of any two. It is generally placed obliquely across the stream, to make the length of its crest considerably greater than the width of the channel (fig. 1), and thereby prevent the water in floods from rising to so great a height as with a shorter crest, to the risk of damaging the adjoining low lands,

and probably putting the mills above in backwater. In such cases, the mill intake, or the navigation lock, as the case may be, is placed usually at the down-stream end of the weir. Much obliquity, however, makes the current to impinge against and to cut into the side of the river opposite the lower face of the weir; and to prevent that effect, weirs are sometimes made of the shape of two sides of a triangle, or rather of that of a hyperbola,

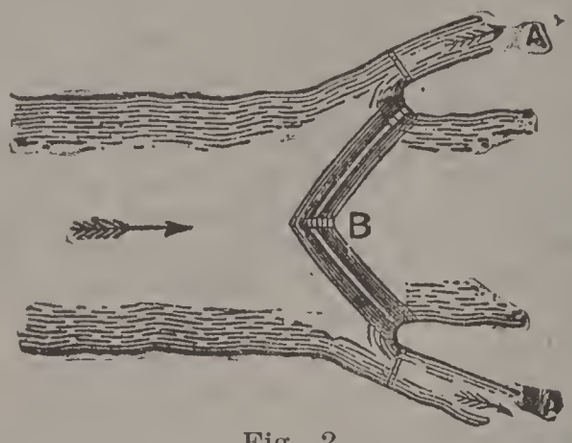

Fig. 2.
A, A, intakes; B, fish-pass.

with its apex pointing up stream, which arrangement is peculiarly applicable to the case of there being an intake for a mill on each side of the river (fig. 2); and the apex is a very suitable place for a fish-pass or ladder. Not unfrequently, when at a wide part of the river, the weir is placed at right angles across, and with a slight

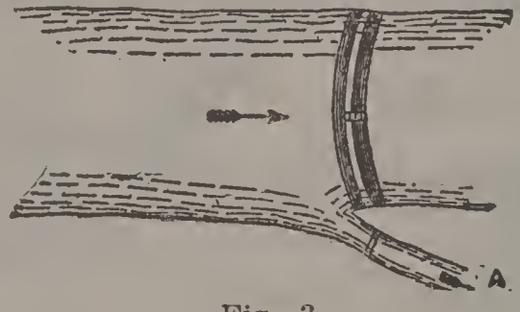

Fig. 3.
A, intake.

curve upward (fig. 3); and a natural shelf of rock is often very advantageously used in either a mill or fishing weir, the low parts being built up where necessary with stone or timber.

The down-stream face of a weir is generally a nearly flat slope of stone 'pitched' or set on edge, and with its toe or lower edge either sunk into rock or protected from being underwashed by a row of timber-sheeting piles, and frequently, also by an apron of timber-planking. This slope is either straight or made with a hollow curve (fig. 4), so as to check the tendency of the water to acquire increasing velocity as it descends; and it is

frequently divided into panels by timber framing, so as, in the event of a portion of the pitching being washed out, to lessen the risk of the whole of it being carried away. The up-stream face is generally a slope dipping into the water, and protected by stone pitching; but it is sometimes a perpendicular wall. To render an ordinary sloping weir water-tight, sometimes there is under the

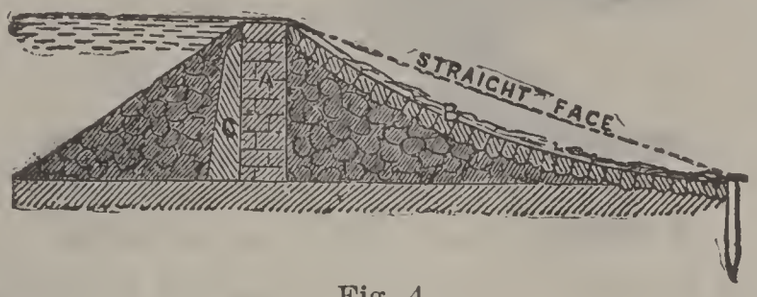

Fig. 4.
A, masonry; B, pitching; C, clay puddle.

crest or coping a row of well-jointed and close-driven timber-sheeting piles; but those being liable to decay, without their decay being visible, a better, though a more difficult and expensive arrangement, is to build a perpendicular wall of water-tight masonry under the crest. In either case, generally there is the additional precaution taken of having a wall of pounded clay on the up-stream side of the wooden or stone barrier; and sometimes a mere wall of pounded clay alone, in the center of the weir, is trusted to, as the sole means of making it water-tight; but the latter is not a satisfactory arrangement, unless the stonework next to the clay be so closely compacted by an admixture of gravel and sand as to prevent any current of water from reaching the clay and cutting into it. The downstream face is sometimes made a nearly perpendicular wall, which, unless for the obstacle which it presents to the ascent of the salmon, is a good arrangement where the bottom of the channel is solid rock, so as not to be liable to be scooped out by the falling water; else it must have at its foot a level

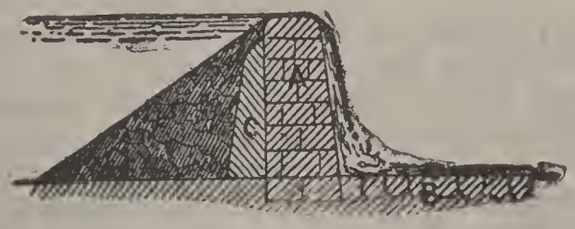

Fig. 5.
A, masonry; B, pitching; C, clay puddle.

apron of heavy masonry for the water to fall on (fig. 5). The down-stream face is sometimes made of a series of steps, so forming a succession of levels and light falls (fig. 6), which is a good plan for breaking the force of the falling water; but it, like the perpendicular face, pre-

sents obstacles to the ascent of the salmon, unless a fish-pass or ladder be provided.

The weir for the purpose of navigation need not differ from the mill-weir, otherwise than that, instead of an intake sluice, there must be a Lock (q.v.) with upper and lower gates, and a chamber between them as long and as

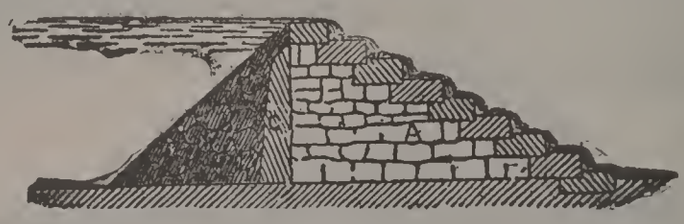

Fig. 6.
A, masonry; B, pitching; C, clay puddle.

wide as the largest vessels navigating the river. Fishing-weirs are generally provided with a sort of cage or cruive, consisting of a chamber (fig. 7), usually four or five ft. in width, and as much or a little more in length, having at the upper end a portcullis grating, called the heck, with the bars vertical and three inches apart, so as to let small fish pass through, and at the lower end two folding horizontally sparred doors called the inscales, pointing upward, but set so as to leave a small opening between the points, through which the ascending salmon enter. Partly from the inward pointing of the inscales, and partly from the instinct of the fish to ascend the river, they seldom get out again, and are easily caught. Frequently weirs serve the purpose both of mill-dams and of fishing-weirs.

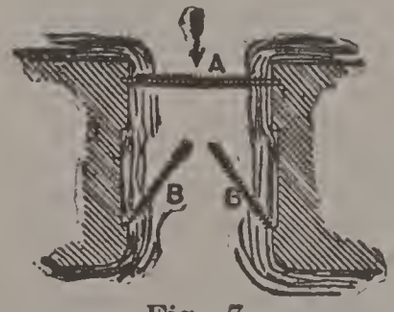

Fig. 7.
A, heck; B, B, inscales.

A weir sometimes used for catching salmon and other fish in tidal rivers consists of a sort of horseshoe shaped structure of loose stone work through which the water can percolate freely, with its heel or open end pointing up-stream. The fish ascend the river with the flood-tide, and, falling back with the ebb, part get embayed within the walls at low water, and are either left dry or are shut in so as to be easily caught.

Weirs, either of stone or of wicker work, are also sometimes used as accessory to what in English fishing-rivers are called putts and putchers, being a short of combination of wooden gratings acting something like those of the cruive and network; and, in many cases, weirs, either natural, as formed by rocks or islands, or strictly artificial, are used for catching fish by means of an attached poke-net extended by the current.

WEIRD, a. *wērd* [AS. *wyrd*, fate, destiny; Goth, *vairthan*; AS. *weorthan*; Ger *werden*, to come to pass, to be-

come]: connected with or able to influence fate or destiny, as the *weird* sisters; of or pertaining to the world of witches; supernatural; unearthly; wild and dreary: N. in *OE.* and *Scot.*, fate; destiny; a spell. WEIRD'NESS, n. *-nĕs*, the state of being weird; unearthliness.

WEIS'HAUPT, ADAM. See ILLUMINATI.

WEISMANN, *vīs'mân*, AUGUST: German biologist: b. Frankfurt-on-the-Main, 1834, Jan. 17. After studying medicine in Göttingen University he was clinical assistant at Rostock in 1856-7, and in the course of the three years 1858-60 visited Vienna, Italy, and Paris, devoting himself especially to studies in the natural sciences. He lived for a year at Schaumburg Castle as body physician to the Archduke Stephen of Austria, and in 1863 went to Giessen to prosecute his zoological studies under Leuckart. Having qualified as a lecturer in the University of Freiburg, he was appointed extraordinary professor there in 1866, and ordinary professor in 1873. His first published work was a treatise on the *Development of the Diptera* (1864). It was followed by a work *On the Influence of Isolation on the Formation of Species* (1872), and *Studien zur Descendenztheorie* (1875-6). This work, translated into English, in 1882 by Prof. Meldola, under the title *Studies in the Theory of Descent* (with a preface by Charles Darwin), treats of several important phenomena in natural history from the standpoint of a thorough believer in the doctrine of natural selection. His *Beiträge zur Naturgeschichte der Daphnoiden* (1876-9) and *Die Entstehung der Sexualzellen bei den Hydromedusen* (1883) are valuable contributions to the developmental aspect of zoology. A series of treatises followed, in which he developed his characteristic theories, among them being *Ueber die Vererbung, (On Heredity), Über die Dauer des Lebens (On the Duration of Life), Ueber Leben und Tod (On Life and Death), Die Kontinuität des Keimplasmas als Grundlage einer Theorie der Vererbund (The Continuity of the Germ-Plasm as the Basis of a Theory of Heredity), Die Bedeutung der Sexuellen Fortpflanzung für die Selektionstheorie (The Significance of Sexual Reproduction for the Theory of Selection), Ueber den Rückschritt in der Natur (On Retrograde Development in Nature)*, and *Amphimixis*. These have appeared in an English translation under the title *Essays Upon Heredity and Kindred Biological Problems* (Vol. I. 1889; Vol. II. 1892). Weismann's other works include: *Das Keimplasma* (1892), in English as *Germ Plasm* (1893); *Die Allmacht der Naturzüchtung (The Omnipotence of Natural Selection)* (1893); *Aeussere Einflüsse als Entwickelungsreize (External Influences as Stimuli to Development,* 1894); *Neue Gedanken zur Vererbungsfrage (Fresh Thoughts on the Question of Heredity,* 1895); and *Ueber Germinalselektion (On Germinal Selection,* 1896). See HEREDITY; WEISMANNISM.

WEISMANNISM: the essential teaching of August Weismann (q.v.), sometimes referred to as 'Neo-Darwinism.' Interest and controversy have gathered mainly round his answer to the question, 'How is it that a single cell of the body can contain within itself all the hereditary tendencies of the whole organism?' In all theories of heredity (q.v.) biologists have assumed that characters acquired by the individual are transmitted to offspring. This Weismann denies, and while biologists have concerned themselves with speculation as to the mode by which such transmissions are effected, he challenges them to prove that they are effected at all. The burden of proof is thus thrown upon his opponents, whose assumptions must give way to experimental evidence, which alone can determine, and that only after protracted record of cases, whether individually acquired characters are transmitted or not. Death, he contends, is not a primary attribute of living matter; the protozoans, or one-celled organisms, being immortal in so far that they do not die naturally. The protozoan, a microscopic jelly-like, apparently—not really—structureless mass, with no seeming unlikeness of parts, multiplies by division. Each half becomes a complete individual, and grows in like manner as the whole to which it belonged, till it also divides, and so on with the multiplication of protozoans *ad infinitum*. It cannot be said of either half that one is parent and the other offspring, for both are of the same age, and only, in a limited sense, as the subdivisions into separate individuals are repeated, can we speak of succession of generations. In these processes there is nothing analogous to death. 'There are,' Weismann says, 'no grounds for the assumption that the two halves of an amœba are differently constituted internally, so that, after a time, one of them will die while the other continues to live. Observations show that when division is almost complete the protoplasm of both parts begins to circulate, and for some time passes backward and forward between the two halves. A complete mingling of the whole substance of the animal, and a resulting identity in the constitution of each half, is thus brought about before the final separation.' Consequently, there is unlimited persistence of the individual; potential, although not absolute, immortality so long as life lasts on the earth.

While the one-celled organisms are thus immortal, only the reproductive cells of the metazoans, the many-celled, are immortal. How has this come about? Weismann accounts for it by the failure of certain protozoans to divide equally, whereby unlikeness of parts and differences of position of parts resulted. 'The first multicellular organisms were probably clusters of similar cells, but these units soon lost the original homogeneity. As the result of mere relative position there arose division of labor, some of the cells were especially

fitted to provide for the nutrition of the colony, while others undertook the work of reproduction. Clearly, those on the outside, being exposed to the direct and constant action of their surroundings, would be the media of nutrition, and the builders-up of the cell-commonwealth. So the result of this cell-clustering would be that the cells fell into two classes, body cells and germ-cells. While the body cells were solely concerned with the nutrition of the organism, losing in this specialization of function the power of reproduction, that power became concentrated in the germ-cells, or, speaking more precisely, in the germ-plasm, which is located in the nucleus of the germ-cell. It is these germ-cells which are the immortal part of the metazoans. With increasing subdivision of function there has been increasing modification of the organism, but the two-fold classification of the somatic or body cells and the germ-cells has remained. The death of the body cells is involved in the ultimate failure to repair waste, because a worn-out tissue cannot forever renew itself, and because cell-division has its limits. In brief, death is the penalty paid for complexity of structure. As it is impossible for the germ-cell to be, as it were, an extract of the whole body, and for all the cells of the body to despatch particles to the germ-cells whence these derive their power of heredity (the fundamental idea of Darwin's theory of pangenesis, q.v.), the germ-cells, so far as their essential and characteristic substance is concerned, are not derived from the body of the individual, but directly from the parent germ-cell. Heredity, Weismann contends, is secured by the transference from one generation to another of a substance with a definite chemical and molecular constitution—in other words, by the 'continuity of the germ-plasm.' This germ-plasm (which, Weismann's critics argue, runs perilously near a metaphysical concept) is assumed to possess a highly complex but extremely stable structure, so stable that it absorbs nourishment and grows enormously without the least change in its complex molecular structure.' Of this germ-plasm it is further assumed that a small portion contained in the parent egg-cell is not used up in the construction of the body of the offspring, but is reserved unchanged for the formation of the germ-cells of the following generations. Only variations of the germ-plasm itself are inherited, and it is upon these variations that natural selection operates. Variations are due not to the influence of external condition nor to use or disuse of organs, but to sexual conjugation. This process combines two groups of hereditary tendencies derived from the mingled germ-plasms of the male and female parents, resulting in those individual differences which form the material from which new species are produced by the action of natural selection. Those differences multiply in geometrical ratio.

The sum of the matter is that natural selection (q.v.) is the dominant factor, that use and disuse of parts and the action of the environment count for nothing, or, at the most, for but a little. Here and there Weismann makes concessions as to the modifying influences of body cells on the germ-cells, and as to the ultimate origin of hereditary individual differences in the direct action of surroundings, which are a partial surrender of his main contention as to the isolation of the germ-plasm. It is not easy to reconcile the theory of an insulated germ-plasm with the ceaseless manufacture, secretion, and expulsion of germ-cells, the materials of which are derived from the materials nourishing the entire organism; nor with the subtle influence of the nervous system on the reproductive organs.

Perhaps the most serious difficulty in Weismann's theory is in the reconciliation of psychological evolution with the continuity of the germ-plasm. For the researches of Spencer, Balfour, and others have demonstrated that the nervous system had its origin in modifications of the primitive skin due to the direct action of the environment. Be this as it may, the wide-reaching sociological significance of the doctrine of heredity —which may be regarded as the physical correlate of determinism—gives an importance to the labors of Weismann that cannot be overrated, and makes urgent the record of extended observations on the lines already laid down by Galton.

Consult: Haeckel, *Generelle Morphologie* (1866); Darwin, *Variation Under Domestication* (1868); Brooks, *The Law of Heredity* (1883); Virchow, *Descendenz und Pathologie* (Virchow's Archiv, ciii., 1886); Einer, *Die Entstehung der Arten* (1888); Galton, *Natural Inheritance* (1889); Romanes, *An Examination of Weismannism* (1893); Spencer, *A Rejoinder to Prof. Weismann* (1894); Hertwig, *The Biological Problem of Today* (1894). For critiques of Weismann, see Eimer, Virchow, *opp. cit.;* Spencer, *Factors of Organic Evolution* (1886); McKendrick, *General Physiology* (1888); Vines, *Nature,* xl. pp. 621-26; Turner, *Nature,* xl. pp. 526-33; and Mivart, *Nature,* xli. pp. 526-33.

WEISS, *wīss,* JOHN: philosopher: 1818, June 28—1879, Mar. 9; b. Boston; son of a German Jew. He graduated at Harvard 1837, and studied in the Harvard Divinity School 1843, having in the meantime attended lectures in European universities. He was for a short time pastor of a Unitarian church in Watertown, Mass., but resigned his charge on account of his anti-slavery principles; then was Unitarian pastor in New Bedford, Mass., and again resigned, now on account of ill-health. After several years of travel and study he went back to the Watertown church, 1859, and held the pastorate till 1870. In religion he was a rationalist, in philosophy a transcendentalist, in politics and social economy a

radical reformer. He went frequently on lecturing tours, his principal themes being *Greek Religious Ideas, Humor in Shakespeare, Shakespeare's Women;* was author of many reviews, sermons, and magazine articles. He pub. *Life and Correspondence of Theodore Parker,* 2 vols. (1864); *American Religion* (1871); translated and edited *Philosophical and Æsthetic Letters and Essays of Schiller* (1845).

WEISSENFELS, *vīs'sĕn-fĕls,* FREDERICK H., Baron DE: soldier: 1738-1806, May 14; b. Prussia. After serving in the British army for a time, he came to this country and settled in Dutchess co., N. Y., 1763. In 1776 he was made lieut.-col. of the 3d New York battalion. He was at the battles of White Plains and Trenton, at the surrender of Burgoyne, and engaged in the battle of Monmouth, commanding the 2d New York battalion. He died in New Orleans.

WEITZEL, *wīt'sĕl,* GODFREY: 1835, Nov. 1—1884, Mar. 19; b. Cincinnati: milit. engineer. He graduated at the U. S. Milit. Acad. and entered the army as brevet 2d lieut. of engineers 1855; was promoted 1st lieut. 1860, capt. 1863, maj. 1866, and lieut.-col. 1882; commissioned brig.-gen. vols. 1862; brevetted and promoted maj.-gen. 1864; and brevetted maj. U. S. A. 1862, lieut.-col. 1863, and brig.-gen. and maj.-gen. 1865. He aided in constructing fortifications at New Orleans 1855-59; was asst. prof. of engineering at West Point 1859-60; chief engineer in Gen. Butler's expedition to New Orleans, and planned the capture of the city; held important commands in operations in Louisiana; was chief engineer of the Army of the James, and constructed the defenses of Bermuda Hundred, James river, and Deep Bottom 1864; was second in command in the first Fort Fisher expedition; and took possession of Richmond after the surrender. After the war he was in charge of important government engineering work.

WE'KA, or WEE'KA. See OCYDROME.

WEL'BECK ABBEY, England: the seat of the Duke of Portland, in Nottinghamshire, three m. s. of Worksop. It occupies the site of an old Premonstratensian abbey, and came into the possession of the Portland family by marriage in 1734. It stands in a park 10 m. in circumference, and is a stately Palladian edifice of mainly the 17th and 18th centuries, but was greatly enlarged about 1864 by the fifth duke, to whom it owes its semi-underground picture gallery, ball room, and riding-school, the last 385 feet long, 104 feet wide, and 51 feet high.

WELCH, ASHBEL: American civil engineer: b Nelson, N. Y., 1809, Dec. 4; d. Lambertville, N. J., 1882, Sept. 25. He was engaged as an engineer on the Lehigh canal in 1827; was made chief engineer of the Delaware and Raritan canal in 1835, and afterward planned the route

and constructed the Belvidere and Delaware railroad. In 1862 he became manager of the Pennsylvania railroad lines in New Jersey, and subsequently was made president. He introduced the block system in railroading in the United States, and published papers on economics and civil engineering. He was elected president of the American Society of Civil Engineers in 1881.

WELCH, PHILIP HENRY: American humorist: b. Angelica, N. Y., 1849, Mar. 1: d. Brooklyn, N. Y., 1889, Feb. 24. From 1882 to 1884 he was attached to the staff of the Rochester *Post Express,* and then removing to New York was employed by the *Sun.* He was prominent among the humorous press writers of his time and was an able satirist. He published *The Tailor-Made Girl* (1888); and *Said in Fun* (1889).

WELCH, WILLIAM HENRY, A.B., M.D., LL.D.: pathologist: b. Norfolk, Conn., 1850, Apr. 8. He graduated at Yale Univ. 1870, and at the College of Physicians and Surgeons, New York, 1875; afterward studied pathology at several European universities. He is (1897) prof. of pathology and demonstrator of anatomy in Johns Hopkins Univ., and pathologist in the univ. hospital. In 1888 he delivered the Cartwright lectures on the *General Pathology of Fever.* He has contributed many articles to standard works, and furnished the chapters on pathology and pathological anatomy in the late editions of Flint's *Theory and Practice of Medicine;* the chapters on *Organic Diseases of the Stomach* in Pepper's *System of Medicine,* and on *General Considerations Concerning the Biology of Bacteria, Infection and Immunity,* in Pepper's *Text-book of the Theory and Practice of Medicine.* His contributions to pathological and anatomical literature have attracted wide attention, and are valued for their clearness and deep research.

WELCHER, or WELSHER, *n. wĕl'shĕr:* in *slang,* a betting man who absconds if he loses his bets.

WELCKER, *vĕl'kĕr,* FRIEDRICH GOTTLIEB: German philologist and archæologist: 1784-1868; b. Grünberg, in Hessen-Darmstadt. He studied at Giessen. On his return from a stay of two years in Rome, he was appointed prof. of anc. lit., first in Giessen, then in Göttingen, finally (1819) in the University of Bonn. Welcker was one of those scholars who deal not only with the history and philosophy of language, but also with the sympathetic understanding and the imaginative reconstruction of the life and thought and art of famous ancient peoples, as these are connected with their languages. We note here his three most important works of a larger compass. The first is the *Æschylean Trilogy* (1824), in which the organic connection and sequence of the Greek dramas are set forth with a richness of constructive detail not altogether free from the fanciful and problematic element. The second is the *Epic Cycle* (1835-

49), a work which has done great service to the right appreciation of early Greek literature. The third, perhaps his greatest work, is the *Götterlehre*, or Greek Mythology (1857-62), which, in selection from the wide German literature of this subject, applies delicate tact and just discrimination.

WELCOME, a. *wĕl'kŭm* [*well*, and *come:* AS. *wel*, well, and *cuma*, a comer]: admitted willingly; gladly received, as a *welcome* visitor; producing gladness in its reception; free to have or enjoy; grateful; pleasing; N. kind reception of salutation: V. to salute or receive with kindness or gladness; to receive and entertain hospitably and cheerfully. WEL'COMING, imp. WEL'COMED, pp. *-kŭmd.* WEL'COMELY, ad. WEL'COMER, n. *-ẽr*, one who welcomes or receives. WEL'COMENESS, n. *-nĕs*, the state of being welcome, pleasing, or grateful. To BID WELCOME, to receive with professions of kindness or hospitality.

WELD, v. *wĕld* [Sw. *wälla;* Ger. *wellen*, to join two pieces of iron at a heat just short of melting—a particular usage of *well*, to boil or spring up (see WELL 2)]: to hammer together into one body when heated almost to melting, as two pieces of iron: N. a joining together, as of two pieces of metal. WELD'ABLE, a. *-ă-bl*, that can be welded. WELD'ING, imp.: N. the process of uniting firmly together by means of hammering or pressure two or more pieces of iron when heated to whiteness. WELD'ED, pp. WELD'ING-HEAT, a white heat to allow the welding process.

WELD, v. *wĕld:* OE. for WIELD.

WELD, n. *wĕld* [Ger. *wau;* F. *Gaude;* Sp. *gualda*]: plant used by dyers to give cloth a yellow color; *Resēda lutĕŏla*, of the family *Resedāceæ;* called also *wold, woold, yellow-weed, dyers'-weed*, and *dyers'-rocket.—Weld*, which belongs to the same genus as Mignonette (q.v.), is a native of waste places in many parts of Europe, but is becoming naturalized in N. Y. and elsewhere in the United States. It has an upright stem, 2-3 ft. high: lanceolate, undivided leaves; and long racemes of small yellow flowers, with 4-partite calyx and prominent stamens. It is used for dyeing, and for this purpose it needs careful cultivation. The best is grown in France, England, and Holland; especially about Cette, in France. Good weld must have flowers of beautiful yellow or greenish color, and abound in leaves; that which is small, thin-stemmed, and yellow is better than that which is large, thick-stemmed, and green; that which grows on dry sandy soils is better than that produced on rich and moist soils. It is cultivated less than formerly, but is still a valuable dye-stuff, serving equally for linen, woolen, and silk—dyeing not only a rich yellow, but, with proper management, all shades of yellow, and producing a bright and beautiful color. Stuffs previously

dyed blue are by means of weld changed to a pleasing green.

WELD, Angelina Emily (Grimke). See Grimke, Angelina Emily.

WELD, *wĕld*, Theodore Dwight: social reformer: b. Hampton, Conn., 1803, Nov. 23; d. 1885, Feb. 3. He was graduated at Phillips Acad., Andover; became, 1830, general agent of a society for promoting manual labor instruction; began to study divinity at Lane Theological Seminary (Presb.), Cincinnati, O., 1833, but, when a students' anti-slavery society was suppressed by the trustees of the institution, left the school. He then went on the public lecturing platform to agitate against slavery; and when, in 1836, he lost his voice, was appointed editor of the publications of the American Anti-slavery Society. He opened at Eagleswood, N. J., 1854, a school in which pupils were received without discrimination of color; removing to Hyde Park, Mass., he engaged in teaching and public lecturing. He published many anti-slavery books and pamphlets.

WELD'ING: process by which some substances are united together in a softened state. It is generally applied to such metals as malleable iron, two pieces of which, heated to redness, may be made to unite by applying them together and beating with a hammer. Other substances, such as horn and tortoise-shell, can be welded by first making separate pieces soft by heat, and pressing them together, which causes so intimate a union that no traces of the junction remain after cooling.

Electric Welding is an application of voltaic electricity to the welding and union of metals. The first suggestion of electric welding was by Joule, of Manchester, England, in a paper published 1856. Successful experiments led to the suggestion by Joule that the use of a magneto-electric machine would best serve for producing the needed electric current. Efficient machines for iron, steel, and other welding, the invention of Prof. Elihu Thomson, of Lynn, Mass., were exhibited to the British Association in Bath, England, 1888, and at the Paris Exposition 1889: by these machines, iron welding is accomplished twice as rapidly as by the most expert craftsmen, and with a strength in the weld equal to 92 per cent of the strength of the solid metal. A second system of electric welding, elaborated in Russia by Dr. Nicolas von Bernados, of St. Petersburg, and already extensively used—especially for thin iron and steel sheets, hoops, etc.—secures the required heat at the surface to be welded by connecting the metal with the negative pole of the dynamo-machine, and applying a carbon electrode to the parts to be heated, thus completing the circuit, while the reducing power of the carbon preserves the heated metal surfaces from oxidation. The Thomson system depends on pure incandescence or heat-

ing by a current passing through a conductor of comparatively high resistance, which conductor is the material to be welded; the Bernados system utilizes the voltaic arc and localizes its heat by making the parts to be welded an electrode of the arc. The former has acquired considerable importance, and its applications are increasing every day; it is impossible to enumerate them in full.

Prof. Thomson's system is based on the use of the alternating current. This type of current can be produced by dynamos, so as to be of high intensity and tension. It is passed through a long coil of wire, which represents the primary of an induction-coil. As secondary a large bar of metal is used, of few convolutions, or sometimes only of one, whose ends are connected to clamps. When the clamps are connected by a large bar of metal, the secondary circuit is closed and appears as one of almost zero resistance. The current induced in it from the primary is one of very low electromotive force because of its lack of convolutions, and of enormously high intensity from its low resistance. In welding, the two pieces to be united are secured in the clamps, the current is turned on, and the ends of the pieces are pressed together. The point of contact is of high resistance. It at once becomes hot, and in a few seconds reaches a white heat. The two pieces are pressed together constantly, and if necessary a little flux (borax, etc.) is added, and a perfect welding action takes place. This process is extensively used also for brazing.

A white heat is needed for welding iron and steel; for other metals a lower heat suffices. The process is applicable to almost all metals and alloys—lead, copper, brass, and others. It has developed the interesting scientific point that probably under proper conditions all metals are weldable. By it also different metals can be welded together. For a ½-in. copper or 1-in. iron bar a current of 20,000 ampères is required.

The application of electric welding to the making of projectiles gives a stronger and better shell, at greatly reduced cost. The method is that of uniting three separately made parts—a head, a base, and a central part cut from a length of solid drawn steel piping. The metal seems to be made extra strong at the point of welding. It is possible to join iron to high carbon steel, also to weld wrought-iron or steel to steel castings, or even to cast-iron. A cheaply made shell using common iron or low carbon steel tubing, and stamped or cast heads and bases, may have all the advantages of wrought-iron and none of the disadvantages of cast metal. A wrought-steel projectile can now be made at less cost than a cast-iron one, and for armor-piercing shells, or even molded steel shell, there can be no comparison, as to cost of production. The process also solves a problem which has baffled inventive skill hitherto—

that of welding the solid heads on to the large brass cartridge-cases now used with the projectiles of rapid-fire guns—guns which, having a non-recoil and pivoted mount, are aimed and fired from the shoulder, and which range in size up to as large as the 6-in. gun. Machines are in operation producing electrically welded wire fencing, in which the wires which in the fence are horizontal are welded to verticals at intervals, the action somewhat resembling that of a loom. In joining pipe into continuous lengths or coils, and also in welding *in situ* street railway rails into a continuous track the electric weld possesses a special adaptability. An interesting application of the electric welder is found in the production of steel tubing by the progressive welding of a longitudinal seam. A long strip of flat sheet or *skelp* is rolled up so as to cause the lateral edges to meet. It then passes between welding rolls whereby the heating current locally traverses the meeting edges and welds them. The operation is progressive from one end of the pipe to the other as it is fed through the machine. The result is a pipe of uniform diameter with walls of even thickness, having a delicate bead along one side where the weld has been made. This bead is removed if the pipe be subsequently mandrel drawn with a reduction of its diameter. In the earlier electric welders the operations of clamping the pieces in place, applying and cutting off the electric current and exerting mechanical pressure, were usually manually controlled. Machines more or less automatic are now frequently employed. In recent types adapted for rapid repetition of work upon identical pieces, the action is entirely automatic; the machine runs continuously and its sequence of actions is definitely determined by its construction. These machines are power driven, movements being imparted for clamping the pieces as they are fed to the machine, for closing the current switch, for exerting pressure to complete the weld, for cutting off the current and for releasing the pieces from the clamps after the operation. In wire fence and chain machines the stock is itself fed automatically and the welding continued until the machine is stopped or the material exhausted. The energy required to effect electric welds naturally varies with the size of the pieces and with the material. It also depends upon the time consumed in the work, which time may be made shorter or longer even with exactly similar pieces.

WEL'DON, N. C.: a town in Halifax co., on the Roanoke river and the Seaboard Air Line and Atlantic Coast Line railways, 97 m. e. of Raleigh. It is at the head of steamboat navigation on the Roanoke. Here are located six churches, a state bank, a winery, several mills, and a weekly newspaper. There is excellent water-power. The surrounding region is an agricultural one. Pop. 1,550.

WELL'DON, James Edward Cowell: English prelate and educator: b. Tonbridge, Kent, 1854, Apr. 25. He was educated at Cambridge, was head master of Dulwich College 1883, and of Harrow School, 1885-98. In the last named year he was appointed to the bishopric of Calcutta and as such was metropolitan of India. He resigned in 1902 and returned to England, where he was made canon of Westminster. Besides standard translations of Aristotle"s *Politics, Rhetoric,* and *Nicomachean Ethics,* he has published: *Sermons Preached to Harrow Boys* (1887); *The Spiritual Life and Other Sermons* (1888); *The Hope of Immortality* (1898); *The Revelation of the Holy Spirit* (1902).

WELFARE, n. *wĕl'fär* [*AS. wel,* well, and *faran,* to go]: state of doing well; prosperity; well-being; happiness.

WELK, v. *wĕlk* [Ger. and Dut. *welken,* to fade, to decay, to wither; to shorten; to fall. Welk'ing, imp. Welked, pp. *wĕlkt.*

WELKED: same as Whelked. See Whelk 2.

WELKIN, n. *wĕl'kĭn* [AS. *wolven;* Ger. *wolke,* a cloud]: the vault of heaven; the sky: Adj. in *OE.,* applied to a sky-colored eye.

WELL, a. *wĕl* [Goth. *vaila,* better: Dut. *wel;* Icel. and Dan. *vel;* OHG. *wela;* Ger. *wohl,* well: W. *gwell,* better (see Weal)]: in a state of health; fortunate; advantageous; satisfactory; recovered from a sickness; correct; proper; in *OE.,* happy: Ad. in a choice or desirable manner; justly; happily; fortunately; rightly; advantageously; skilfully; conveniently; considerably; very much; to a sufficient degree; perfectly; a word expressing satisfaction, or merely expletive, as '*well, well,* be it so,' '*well,* let us go.' As well as, together with; besides; in addition to. Well-appointed, a. fully furnished and equipped. Well-behaved, a. seemly and prudent in conduct. Well-being, n. happiness; prosperity. Well-born, of good or respectable birth. Well-bred, educated in polished manners; cultivated; refined. Well-doer, one who does well. Welldoing, n. performance of duties in a proper manner: Adj. accomplishing one's duties properly. Well done, an exclamation expressive of praise or approbation. Well enough, good in a moderate degree. Well-favored, handsome; beautiful; pleasing to the eye. Well-informed, furnished with much correct information; intelligent. Well-intentioned, having upright or honorable purposes. Well-known, fully known; notorious. Well-mannered, polite; civil; mannerly. Well-meaning, having good intentions. Well-meant, rightly intended; kind. Well-met, term of salutation expressive of great satisfaction. Well-nigh, almost; nearly. Well-off, thriving; prosperous. Well-to-do, easy in circumstances; prosperous. Well-read, extensively informed from books. Well-spent,

passed in virtue; spent in a profitable way. WELL-SPOKEN, uttered with propriety and fitness. WELL-WISHER, one inclined to act to another as a friend. WELL-TIMED, done or said at the proper time. WELL-WORN, much worn.

WELL, n. *wĕl* [AS. *weallan;* Icel. *vella;* Ger. *wallen,* to boil, to bubble up: AS. *wylle;* Dut. *wel,* a spring: Ger. *welle,* a wave or surge]: a fountain or natural supply of water; a spring or source; a deep narrow pit dug in the earth for the purpose of retaining spring or other water (see WATER-SUPPLY: TUBE-WELL): an inclosure around the bottom of a ship's pumps; an inclosed space in a fishing-boat for keeping fish alive; a deep excavation for military purposes; in *arch.,* the space in which winding stairs are placed; any similar space, as between buildings, for admission of light and air: V. to pour forth, as from a spring; to issue forth, as water. WELL'ING, imp. WELLED, pp. *wĕld.* WELL-DRAIN, n. a deep pit to drain wet land: V. to drain wet land by means of pits or wells. WELL-HEAD, source; fountain; well-spring. WELL-SINKER, one who digs wells. WELL SINKING, the act or business of sinking wells. WELL SPRING, a fountain; a source of continual supply. WELL-WATER, water drawn from a well. ARTESIAN-WELL. See ARTESIAN-WELLS.

WELL-A-DAY, int. *wĕl'-ă-dā* [AS. *wá-lá-wá,* alas!—*lit.,* woe! lo! woe!]: an exclamation expressive of distress or grief; alas! oh me! also in *OE,* WEL'AWAY, int. *-ă-wā,* from which WELL-A-DAY has been corrupted.

WEL'LAND CANAL: Ontario, Canada, a ship canal extending from Port Colborne to Port Dalhousie, across the neck of land west of the Niagara river and falls, and maintaining continuous navigation between Lake Erie and Lake Ontario. It traverses Welland co., and near Welland, the capital, the Welland or Chippewa river forms part of its course. The canal is 26¾ m. long, 14 ft. deep, and surmounts a rise of 362¾ ft. by 25 locks. It was begun in 1824 and was opened to travel in 1833. It was enlarged in 1871, and again in 1900.

WELL'DON, JAMES EDWARD COWELL, M.A.: English prelate and educator: b. Tonbridge, Kent, 1854, Apr. 25. He was educated at Cambridge, was head master of Dulwich College 1883, and of Harrow School. 1885-98. In the last named year he was appointed to the bishopric of Calcutta and as such was metropolitan of India He resigned in 1902 and returned to England, where he was made canon of Westminster. Besides standard translations of Aristotle's *Politics, Rhetoric,* and *Nicomachean Ethics,* he has published: *Sermons Preached to Harrow Boys* (1887); *The Spiritual Life and Other Sermons* (1888); *The Hope of Immortality* (1898); *The Revelation of the Holy Spirit* (1902).

WELLE-MAKWA: Central Africa, the most impor-

tant affluent of the Ubangi, a tributary of the Kongo. Its source is on the western slope of Mount Emin Pasha, and after a course of about 400 miles through a fertile and rich country to the n. and e. of the Kongo, it flows into the Ubangi at Dayu, opposite Yakoma, at the confluence of two other headstreams. The identity of the Welle-Makwa was uncertain for many years; explorers thought it was a different stream to the Ubangi, but their connection was fully established in 1888, and the river throughout its entire length is sometimes called the Welle-Makwa.

WELLES, Gideon: American statesman: b. Glastonbury, Conn., 1802, July 1; d. Hartford, Conn., 1878, Feb. 11. He studied at Norwich University, Vt., but did not complete the course there, and for a time turned his attention to the study of law. In 1826, however, he entered journalism as editor of the Hartford *Times*, which under his management became one of the leading Democratic papers of the state. He was one of the first publicly to advocate Andrew Jackson's election to the presidency, and always warmly supported him. In 1827-35 he was a member of the Connecticut legislature, and both as legislator and editor advocated the abolition of imprisonment for debt, opposed the practice of special legislation, and succeeded in obtaining the passage of general laws for the incorporation of business corporations. In 1836 he resigned the editorship of the *Times*, but continued to write for that paper. In 1835, 1842, and 1843 he was chosen state comptroller; in 1836-41 he was postmaster of Hartford; and in 1846 was appointed chief of the bureau of provisions and clothing in the navy department, which office he held till 1849. He had always been opposed to the extension of slave territory, and on the organization of the republican party in 1855, became identified with it, and was republican candidate for governor of Connecticut in 1856; and a member of the national committee. In 1861 he was appointed secretary of the navy, and conducted the affairs of his department with marked executive ability throughout the civil war; he continued in office under President Johnson till 1869. He was later affiliated with the liberal republicans, and in 1876 was a supporter of Tilden. He wrote *Lincoln and Seward* (1874).

In 1909 a diary he kept during his term in Washington was published. It is a photographic rendering of the men of the day, showing, without malice or heat, their schemes and their motives.

WELLESLEY, Arthur. See Wellington, Arthur Wellesley, Duke of.

WELLESLEY, Richard Colley, Viscount and Marquis: British statesman: b. Dublin, 1760, June 20; d. London, 1842, Sept. 26. He was educated at Oxford and on his majority took his seat as Earl of Mornington

in the Irish house of peers. Three years after he was returned to the British house of commons as member for Beeralston and afterward sat for Windsor (1787-96), and for Old Sarum (1796-7). He was appointed governor-general of India in 1797, and in 1799 created Marquis Wellesley in the Irish peerage. His administration, both for its ability and the large accessions of territory made under it by the conquest of Mysor and the humbling of the Mahrattas, and in 1809 became foreign secretary under Mr. Perceval. In 1812 he resigned his place chiefly because he was in favor of Catholic emancipation and did not return to office till 1821, when he became lord-lieutenant of Ireland. This post he retained till 1825, when he was removed from it by his brother, the Duke of Wellington, who was an opponent of emancipation and had become prime minister. In the Grey ministry he held the office of lord-steward till 1833, when he again became lord-lieutenant of Ireland. Displaced in the following year by the Peel ministry, he afterward held the office of lord-chamberlain for a few months of 1835.

WELLESLEY, Mass.: town in Norfolk co.; on the Boston and Albany railroad, 14 m. w. of Boston. It was incorporated as a town in 1881, and includes the villages of Wellesley, Wellesley Hills, and Wellseley Farms. It is principally a residential town, with many broad streets and handsome residences. It is the seat of Wellesley College, and also of Dana Hall, a secondary school for girls; Wellesley School, and Rock Ridge Hall, secondary schools for boys; and two Roman Catholic academies, the Academy of the Assumption for girls, and Saint Joseph's Academy for boys. There is also a public high school at Wellesley Hills, founded in 1865, and a public library of about 12,000 volumes. The government is vested in the town-meeting and the selectmen, chosen annually. The waterworks are owned and operated by the town. Pop. (1900) 5,072; (1910) 5,413.

WELLESLEY COLLEGE: a college for women located at Wellesley, Mass. It was founded by Henry F. Durant to give 'to young women opportunities for education equivalent to those usually provided in colleges for young men.' The charter was obtained in 1870, and the college first opened to students in 1875. It is non-sectarian in control; three representatives of the alumnæ serve on the board of trustees. In 1888-94 the system of elective courses was established which is still in force. The college confers one baccalaureate degree, A.B., and the graduate degree, A.M. Certain courses are required in mathematics, philosophy, physiology, Bible history, English, some foreign language, and natural sciences; in addition to the required studies every candidate for the degree must take a sufficient amount of elective work to complete the equivalent of 57 one-hour courses, a one-

hour course being a course given once a week for one year; before 1905 the requirement was 59 one-hour courses. Of these electives 18 one-hour courses must be taken in one of the following ways: 9 in each of two subjects, related or unrelated; 9 in one subject with 9 divided between two tributary subjects; 12 in one subject with 6 in a tributary subject; 12 in one subject with 6 divided between two tributary subjects. Pedagogical courses are offered in the history and science of education and in methods of teaching; art and music are included in the curriculum; the courses in history and theory in both departments count toward the degree; studio work in art counts toward the degree after one course in history is completed; the regular practical work in music does not count toward a degree. A full course in music leading to the certificate of the department may be taken by candidates for the A.B. degree who remain at the college five years. The college contributes toward the support of the American School of Classical Studies in Athens, the American School of Classical Studies in Rome, the Marine Biological Laboratory at Wood's Holl, and the women's table at the Zoological Station at Naples. There are 44 scholarships for undergraduates and one graduate fellowship. The students maintain literary and dramatic societies and a number of the Greek letter societies. The campus has a particularly beautiful situation within the limits of the town; it includes a lake which affords excellent opportunity for rowing and skating; on this lake is held the annual 'Float.' The buildings include College hall, the Farnsworth art building, the observatory, Houghton Memorial chapel, and the residence halls or 'cottages for students.' In 1903 an addition to the endowment of $150,000 was raised to offset the gift from John D. Rockefeller of a central heating plant. The library contains 54,813 volumes, including the Gertrude Memorial Library, the Library of American Linguistics, and other special and departmental libraries. The students number 981, and the faculty 85.

WELLHAUSEN, *vĕl'how-zĕn,* JULIUS, D.D.: biblical critic: b. Hameln-on-the-Weser, Germany, 1844, May 17. Wellhausen studied under Ewald at Göttingen (1862-65); became *private docent* there in the theol. faculty 1870, and ordinary professor of theology at Greifswald 1872. In 1882 he resigned his professorship because his change of views would not allow him longer to hold it conscientiously, and became professor in the theology faculty at Halle, then at Marburg (1885), and at Göttingen (1892). He is leader of the school of criticism that rejects the supernatural in the Old Testament, treating it as a body of merely human literature, which it ascribes to others than their reputed authors, and to later dates than have been generally assigned to them. See

HEXATEUCH; HIGHER CRITICISM. Wellhausen's chief works are *Der Text der Bücher Samuelis* (1871); *Pharisäer und Sadducäer* (1874); *Prolegomena zur Geschichte Israels* (Berlin 1878; Eng. transl. *History of Israel*, Edinburgh and London 1885); *Die Composition des Hexateuchs und der Historischen Bücher des Alten Testaments* (1889); *Israelitische und jüdische Geschichte* (1894). Later works are *Muhammed in Medina* (1882); *Der arabische Josippus* (1897); *Reste arabischen Heidentums* (2d ed. 1897), first published in the *Skizzen und Vorarbiten; Die Kleinen Propheten übersetzt, mit Noten* (1892; 3d ed. 1898); *Das Evangelium Marci* (1903).

WEL'LING, JAMES CLARKE, American educator: b. Trenton, N. J., 1825, July 14; d. Hartford, Conn., 1894, Sept. 4. He was graduated from Princeton in 1844, was appointed associate principal in the New York Collegiate School in 1848, and in 1856-65 was literary editor of the Washington *National Intelligencer*. He was clerk of the United States court of claims in 1862-7, in 1867-70 was president of St. John's College, Annapolis, Md.; occupied the chair of belles-lettres at Princeton in 1870-1; and in 1871-94 was president of Columbian University, Washington, D. C. He was a regent of the Smithsonian Institution, pres. of the Corcoran Gallery of Art, and also of the Philosophical and Anthropological Societies of Washington.

WELLINGTON, Chile: an island off the w. coast of Magallanes Territory, 138 m. long and 35 m. wide. Its northernmost extremity is Cape San Roman.

WELLINGTON, Kan.: city and county-seat of Sumner co.; situated in the south central part of the state, near the s. boundary, on Slate Creek, and on the Atchison, T. & S. F., the Southern K., and the Chicago, R. I. & P. railroads. It was first settled in 1871; and became a city of the third class in 1876, and a city of the second class in 1880. It is situated in an agricultural region and carries on an important export trade in grain and other agricultural products; it contains grain elevators, three flouring mills, plow works, and the shops of the Atchison, Topeka & Santa Fé Railroad. There are three banks with a combined capital of $175,000. It is the seat of the Sumner County High School. The city government is vested in a mayor and a council of 10 members, half of whom are elected each year; the city owns the waterworks and the electric-light plant. Pop. (1900) 4,245; (1910) 7,034.

WELLINGTON, New Zealand: (1) The Capital city of New Zealand, and also of the provincial district of Wellington, situated on Lambton Harbor, on the s.w. of Port Nicholson, an inlet of Cook Strait, about 1,200 miles s.e. of Sydney in Australia. Its fine harbor is the safest and most commodious in New Zealand. The prin-

cipal buildings and institutions are: Government House, a fine building in Italian style, in its own grounds; the houses of legislature, including a parliamentary library building; the government building; the supreme court edifice; Anglican, Roman Catholic, Wesleyan, Primitive Methodist, Presbyterian, Congregational, and other churches; a free public library; Wellington College, a girls' high school, Saint Patrick's College (R. C.), a technical school, and other similar educational institutions; Victoria University College, affiliated to the University of New Zealand; a general hospital; a lunatic asylum; the Boys' Institute; and the botanical gardens. The city is lighted by electricity, and has a good water supply, and its streets are traversed by electric tramways. The chief industrial establishments are tanneries, candle and soap works, coffee-mills, boot factories, biscuit works, foundries, brick-works, saw-mills, woolen-mills, breweries, and meat-preserving works. The town has a patent slip, and has been fortified. Pop. (1901) 43,638, including suburbs, 49,344. (2) A provincial district in the south of North Island, area about 11,000 sq. m. Its coast is but little indented, the principal openings being Palliser Bay and Port Nicholson in the s. It is traversed throughout almost its whole length by a range of mountains, averaging about 4,000 feet in height. Parellel to this main range, and nearer the east coast, there is a series of lower ranges, and between these two chief mountain-systems extends the broad Wairarapa Plain, merging northward into an undulating country. A considerable extent of fairly level country, increasing in breadth northward, is also found along the west coast. The district is well watered by several rivers and in the south are Lakes Wairarapa and Onoke. Wellington is well wooded, and timber is one of its chief exports. Much of the surface is admirably adapted for pastoral purposes, and there are now in the district over 4,000,000 sheep, in addition to large numbers of cattle and horses. Agriculture is also successfully carried on in several parts, the principal crops being oats, wheat, potatoes, and turnips. The number of cheese and butter factories is steadily increasing. Little mineral wealth has been found in the district of Wellington, but some gold has been worked. The chief town is Wellington, the capital of the colony. Railways run from Wellington to Napier and New Plymouth. Pop. (1901) 141,354.

WELLINGTON, Ohio: village in Lorain co.; on the Wheeling & L. E., and the Cleveland, C. C. & St. L. railroads; about 35 m. s.w. of Cleveland. It is the commercial centre of a farm and dairy section. It is noted for its large annual shipments of cheese. It has flour mills, lumber mills, a foundry, and in the vicinity are a number of butter and cheese factories. The two banks have a combined capital of $75,000. Pop. (1910) 2,131.

WEL'LINGTON, Arthur Wellesley, Duke of: one of England's greatest generals: b. 1769, in the last of Apr. or May 1; in Dublin, or at Dungan Castle, Meath, Ireland; died 1852, Sep. 14: third son of Garrett Wesley (first Earl of Mornington), and bro. of the Marquis of Wellesley (q.v.). He completed his military education, a few years before the French Revolution, in the military college of Angers, in France. He entered the Brit. army as ensign in the 41st regt. 1787, and became lieut.col. of the 33d 1793. In 1794 he embarked in command of the 33d regt., to join the Duke of York's army in the Netherlands. In this, his first term of actual service, he commanded three battalions on the retreat of the army through Holland, and distinguished himself in several repulses of the French. In 1796 he accompanied his regt. to India, where his brother, the Marquis of Wellesley, shortly afterward arrived as gov.gen. W. commanded the subsidiary force of the Nizam, when the reduction of the Mysore was decided upon, and his division defeated Tippoo Sultan's right flank at Mallavelly. At the assault and capture of Seringapatam, he commanded the reserve in the trenches. He was appointed to the command in Mysore, and took the field (1800) against Dhoondiah Waugh, a Mahratta freebooter, who was defeated and slain. He was named second in command of the expedition which sailed from India to assist the English army in Egypt, but was prevented from embarking by illness. In the Mahratta war of 1803 the young general won his first fame. After besieging and capturing Ahmednuggur, W., with only 4,500 men, came upon the combined Mahratta forces, 40,000 or 50,000 strong, and, not waiting for a larger Brit. force that was on its way, won the brilliant victory of Assaye (q.v.). The victory of Argaum followed, and the great fort of Gawulghur, supposed impregnable, having been taken in Dec., the Mahratta chiefs sued for peace, after one of the most extraordinary campaigns on record. W. was made K.C.B., and received the thanks of the king and parliament. In 1805 he returned to England, and in Nov. commanded a brigade in Lord Catheart's expedition to Hanover. In 1806 he obtained a seat in the house of commons for Newport, Isle of Wight, and 1807, Apr., was appointed chief sec. to Ireland, the Duke of Richmond being lord-lieut. He held a command in the army under Lord Catheart, and in the expedition against Copenhagen 1807; and after the affair at Kioge, negotiated the capitulation of Copenhagen. He received the thanks of the house of commons in his place, and returned to Ireland. In 1808 he commanded an expedition which sailed from Cork, the first division of the Brit. army sent out to assist in the expulsion of the French from Spain and Portugal. He landed at Corunna, and offered his aid to the army and people of Galicia, but the offer being declined, he finally landed 1808, Aug., with 10,000 troops, at the mouth of the river Mondego, in Portugal. The whole of n. Portugal was then in arms against the French. The affairs of Obidos and Roliça were quickly followed by the battle of

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Vimiero or Vimieira, in which he defeated Junot, who lost 3,000 men and 13 pieces of cannon. After this event W. signed the armistice which led to the Convention of Cintra (q.v.). Being superseded in the command of the army by men who were his superiors only in military rank and seniority, he returned to England. For the battle of Vimiero, he again, in his place, received the thanks of the house of commons. On the death of Sir John Moore, he reassumed (1809, Apr. 22) the command of the Peninsular army, resigning the office of chief sec. of Ireland. He had now to contend with Soult and Victor, who had entered Portugal at the head of a veteran army, and were in possession of its finest northern provinces. Oporto had been taken by Soult, and W. was desirous to bring him to action at once, that he might not make his retreat unharmed. W.'s passage, at Villa Nova, of the Douro, a wide, deep, and rapid river, in the face of a formidable enemy, who had removed every boat and barge to the opposite side of the river, was one of the boldest and most successful operations of the war. W. entered Oporto the same day, and followed the French army. He was now, by a decree of the prince regent of Portugal, proclaimed marshal-gen. of the Portuguese army. The French, under Victor and Sebastiani, had fallen back to a point where reinforcements were to meet them; and 1809, July 27, 28, they were defeated by the Brit. under W. at Talavera—a battle in which the slaughter on both sides was terrible. W. was unable to follow up his victory owing to the non-co-operation of the Spanish army under Cuesta; and his lack of supplies, as well as the junction of Soult, Ney, and Mortier in his rear, compelled him to fall back on Badajoz. The thanks of parliament were voted for the victory of Talavera, and Sir Arthur Wellesley was created (1809, Sep. 4) a peer by the titles Baron Douro of Wellesley and Viscount Wellington of Talavera, with a pension of £2,000. In 1810, May, the French collected under Massena in such superior force in his front that he fell back on Busaco, where he made a stand. Here the French (Sep. 27) made two attacks, but were repulsed with great slaughter. After this, he retreated to Torres-Vedras (q.v.), chiefly to the occupation of which line of defense, and his judicious method of maintaining it, may be attributed the ultimate success of the Peninsular war. Massena, unable to find subsistence for his army, began his retreat to Santarem, pursued by W., along the line of the Mondego. In 1811, Apr., he received the thanks of parliament for the liberation of Portugal. Spain, however, was now subdued by the French. The Spanish armies were annihilated, and it was of first importance that W. should be able to keep his rear open to the Tagus. W. having invested Almeida, Massena attempted to relieve it, but was skilfully repulsed at Fuentes de Onoro, May 3 and 5. The fall of Almeida followed, and W. ordered Badajoz to be invested. At this time, as at others, he had great reason to complain of lack of support and reinforcements from England. He had only the force which had

followed Massena from Torres-Vedras, diminished by 9,000 men, *hors de combat* in so many sanguinary encounters. Writing to Marshal Beresford, he said: 'I inclose a dispatch from Lord Liverpool [then at the head of the home government]; I believe they have all gone mad.' The siege was carried on with vigor; but learning that Soult and Marmont designed to join their armies into one to relieve Badajoz, and his own inadequate force not justifying him in risking a battle, he raised the siege, and retired to the frontiers of Portugal. He next laid siege to the strong fortress of Ciudad Rodrigo, which was carried by storm, at night, 1812, Jan. 19. For this achievement he was created by the regency a grandee of Spain, with the title Duque de Ciudad Rodrigo. He again received the thanks of parliament, and a further pension of £2,000 a year, and was advanced in the British peerage by the title Earl of Wellington. He next marched toward Badajoz, invested it in March, and carried it by storm Apr. 6, after frightful carnage; the Allies losing nearly 5,000 men. In June he advanced to Salamanca, captured the convents there, which had been fortified by the French, and drove Marmont to the Douro. July 22 he gained at Salamanca one of his greatest military triumphs. Marmont extended his line, with the view of turning W.'s right; but the latter, perceiving that the enemy had thus weakened their left and centre, vigorously assailed those points, and, after obstinate resistance, put the whole army to rout. Ammunition, stores, two eagles, 11 pieces of cannon, and 7,000 prisoners, were the trophies of victory. The loss of the Allies was only about 700 killed and 4,000 wounded. Marmont lost an arm, and four French generals were killed. W. received the order of the Golden Fleece, entered Madrid, was made generalissimo of the Spanish armies, and was advanced in the British peerage by the title Marquis of Wellington. The thanks of parliament were again voted to him, with the sum of £100,000, to be laid out in the purchase of lands to be settled on him, his heirs and successors. In Sep. he marched to Burgos, but, failing to capture it, again retreated to the frontiers of Portugal. W. visited Cadiz and Lisbon, where he was received by the whole population. In May he marched his army into Spain in two columns, and June 21 gained, at Vitoria, another signal victory over the French, commanded by King Joseph assisted by Marshal Jourdan. The enemy lost 151 pieces of cannon and all their ammunition. The king's private carriage, letters, etc., fell into the hands of the victors. In exchange for the baton of Jourdan, which was found on the field, the prince regent forwarded to W. the baton of a field-marshal of England. By this splendid and important series of victories, he had reached the summit of martial glory. The deliverance of Spain from the French was now certain. His infantry were soldiers who would, in his own words, 'go anywhere and do anything;' and even the invasion of France itself seemed to his countrymen no longer chimerical. He pursued the French army to France by Pamplona. He failed.

July 25, to carry San Sebastian by assault, but gained another decisive battle over Soult at the Pyrenees, and the French army retreated into France. A second attempt to carry San Sebastian by assault was successful, but it cost W. 2,300 in killed and wounded. He now crossed the Bidassoa, and invaded France. Pamplona surrendered. After the passage and battle of the Nivelle, and the passage of the Nive, the victorious army of W. was attacked, Dec. 10 to 18, on the left and right, by Soult, who was defeated. Leaving two divisions to blockade Bayonne, W. followed Soult with the rest of the army: 1814, Feb. 27, he defeated Soult at Orthes, and crossed the Adour. The affairs of Aire and Tarbes were followed by the passage of the Garonne; and, Apr. 10, W. consummated this series of brilliant victories by again defeating Soult under the walls of Toulouse. The allied Russian and German armies having entered Paris, and Napoleon having signed his abdication a few days before, this last battle would not have been fought but for the non-arrival of news of the events of Paris. In a few weeks W was in Paris, presenting the trophies of his brilliant campaign to the allied monarchs. He was created, May 3, Marquis of Douro, and Duke of W. in the Brit. peerage, and received an additional grant of £400,000. He received for the 12th time the thanks of parliament for his services, and on his arrival in England was greeted with the utmost enthusiasm. June 28 he took his seat for the first time in the house of lords. He next returned thanks at the bar of the house of commons, and was addressed by the speaker. He was appointed ambassador-extraordinary to the court of France 1814, July, whence he proceeded to the Congress of Vienna. Napoleon having escaped from Elba, the congress was abruptly broken up. W. was appointed commander of the Brit. forces on the continent of Europe, and from Vienna joined the army at Brussels. It appeared probable that Napoleon would make a bold advance into Belgium, and its defense was assigned to an Anglo-allied army under W., and a Prussian army under Blücher. The battles of Ligny (q.v.) and Quatre-Bras (q.v.) were succeeded 1815, June 18, by the great battle of Waterloo (q.v.). Here the grand and decisive blow was struck; here for the first and last time the emperor and the great English gen. met and measured swords; and here the power of Napoleon was finally crushed. The allied armies under W. and Blücher, marched on Paris; the French army evacuated Paris under a convention; and Louis XVIII. entered Paris the very day after the English army. Marshal Ney was brought to trial. He relied on the terms of the capitulation of Paris, and appealed in vain to W., who denied that the French king was bound by the convention —a reading which it is impossible to justify, as Sir A. Alison has shown in his *History of Europe*. At the request of the allied sovereigns, W. took command of the army of occupation, and resided in Paris 1815–18. Two attempts were, during this period, made upon his life: gunpowder was placed in his cellar for explosion: and one Cantillon

discharged a pistol into his carriage; for which attempt at assassination, Napoleon I. left the miscreant a bequest in his will. When the allied armies evacuated France 1818, the emperors of Russia and Austria, and the king of Prussia, created W. a field-marshal of their armies. He was created Prince of Waterloo by the king of the Netherlands. The gratitude of the British nation was, meanwhile, enthusiastically manifested. Statues were raised to his honor in the metropolis. Parliament voted £200,000, in addition to former grants; and the mansion and estate of Strathfieldsaye were purchased, to be held by W. and his heirs. The office of master-gen. of the ordnance, now abolished, but then comprehending the control of the artillery branch of the service, was conferred on him. At the coronation of George IV., 1821, he officiated as lord high constable of England. In Oct. he attended George IV. to the field of Waterloo. In 1822 he represented Great Britain at the Congress of Verona, where he ineffectually exerted his influence to prevent the invasion of Spain by a French army, in support of absolutist principles. In 1826 he went on a special embassy to St. Petersburg, when he induced Emperor Nicholas to act in common with England and other powers, as mediators in the quarrel between Turkey and Greece. On his return he was appointed constable of the tower. In 1827 he succeeded the Duke of York as commander-in-chief of the army, and was made col. of the grenadier guards.

From this period his political career may be said to begin. When Canning received the commands of George IV. to form an administration, W., with six other members of the Liverpool administration (including Lord Eldon and Peel), resigned office. In the explanations which he gave, he emphatically denied that he had entertained the ambition of himself filling the post of first minister; and said he felt his incapacity for such an office so strongly that he should have been 'mad' if he had coveted it. In 1827, Aug., after Canning's death, W. again accepted the command of the army, which he resigned on being called by George IV., 1828, Jan. 8, to form an administration. Of strong tory politics, he was, nevertheless, the first minister to cede to the growing popular power. The Test and Corporation Acts were repealed, and the removal of the Rom. Cath. disabilities was the first measure proposed by W. in the following session, on the ground of the formidable attitude of the people of Ireland and the danger of civil war. This measure involved him in a bloodless duel with the Earl of Winchelsea. The French revolution of 1830 appears to have influenced him in making a firm stand against parliamentary reform in the same proportion that it raised the demands of the people for it; and when the struggle of continental Europe to emancipate itself from arbitrary government strengthened the popular cry for 'parliamentary reform,' he chose the earliest moment to declare the unalterable perfection of the representative system of the country, and the determination of his government to resist all measures of parliamentary reform;

see REFORM, PARLIAMENTARY. His unpopularity became excessive; and anticipating a defeat in the house of commons, on Brougham's proposition for a reform, W. resigned office, and was succeeded by Earl Grey. He had meanwhile become lord warden of the Cinque Ports. Under the administration of Earl Grey, W held no office. He strenuously opposed the Reform Bill, and a London mob broke the windows of Apsley House, and hooted and pelted him in the streets. In 1834, Jan., he was elected chancellor of the Univ. of Oxford. On the enforced resignation of Lord Melbourne, 1834, Nov., he was sent for by William IV. He declined to take the premiership, and was intrusted by the king with the whole charge of the government, and the seals of the three secretaries of state, until Sir R. Peel could arrive from Rome. Peel constructed a conservative government, in which W. took the office of foreign sec. In 1835, Apr., Peel resigned, and henceforward W. ceased to take a prominent share in the civil government of the country. He gave a generous welcome to Soult, who represented France at the coronation of Queen Victoria, and was received with great cordiality by the people on this occasion. In 1839, Aug., a grand banquet was given to him at Dover, as lord warden of the Cinque Ports, on which occasion Lord Brougham proposed his health in a brilliant eulogium. In 1841 he accepted a seat in the cabinet of Sir R. Peel, without office. In 1842 the queen visited him at Walmer Castle, and in the same year he was reappointed to the command of the forces. In 1845 he doubted the policy of repealing the Corn Laws; but in conformity with his usual practice of considering 'how the queen's government was to be carried on,' he determined to stand by Sir R. Peel in his attempt to abolish them. W. not merely consented to remain in the cabinet, but accepted the higher office of pres. of the council in lieu of the post of lord privy seal. When the bill came up to the lords, W., with great emotion and earnestness, warned the peers not to reject the bill, and never to separate themselves from both the crown and the house of commons. His speech made a great impression, and the bill passed a second reading by a considerable majority. He retired with the Peel government 1846, July. After this event he may be said to have withdrawn from political strife; and it is evident that his share in the repeal of the Corn Laws cast a halo of popularity around the remainder of his life. In 1848 he called attention to the unsatisfactory state of the national defenses, in a letter to Sir J. Burgoyne. As commander-in-chief, he directed great preparations to be made to prevent a Chartist outbreak on Apr. 10. The few remaining years of the old hero were calm and peaceful; the old strife had ceased, and the echoes of his transient unpopularity had long died away, leaving him venerated and beloved by the whole nation. In his 84th year he was seized at Walmer Castle with an epileptic fit, became speechless, and died the same afternoon. His remains were honored by a public funeral, and were laid to rest in St. Paul's Cathedral, by the side of those of Lord Nelson.—His

Despatches, pub. by Col. Gurwood, 12 vols., are the best monument to his glory; they exhibit him as a commander who overcame countless difficulties by honesty, sagacity, singleness and constancy of purpose, and devotion to duty. Throughout his long career, he appears the same honorable and upright man, devoted to the service of his sovereign and country, just and considerate to all who served under him. As a general, he was cautious, prudent, and careful of the lives of his men; but when safety lay in daring, as at the battle of Assayé (q.v.), he could be daring in the extreme. He had an iron constitution and was not more remarkable for his personal intrepidity than for his moral courage: the union of these qualities obtained for him the appellation 'the Iron Duke,' by which he was affectionately known in his later years. His parliamentary oratory was plain and to the point. He spoke without fluency or art, yet his strong sense and practical sagacious judgment gave him great weight with his brother-peers. His tastes were aristocratic; and his aides-de-camp and favorite generals almost all were men of family and high connections. Altogether, he was a grand type and model of an Englishman; and in the general order issued by the queen to the army, he was characterized as 'the greatest commander whom England ever saw.' He married, 1806, the second daughter of the third Earl of Longford, and by her (died 1831) he left two sons—Arthur Richard, second Duke of Wellington (who also inherited the earldom of Mornington), and Charles.

Colonel Gurwood's *Despatches of the Duke of Wellington*, 12 vols.; Gurwood's *General Orders of Duke of Wellington*, 1809-18; Napier's *History of the Peninsular War;* Alison's *History of Europe;* Thibaudeau, *Histoire de l'Empire;* Thiers, *Histoire de l'Empire;* Marquis of Londonderry's *Narrative of the Peninsular War*, 1808-13; Gleig's *Life of Arthur, Duke of Wellington;* Bourrienne's *Memoires sur Napoleon;* Las Casas, *Mémorial de Ste.-Hélène; La Vie de Wellington*, by Brialmont; *Speeches in Parliament of Duke of Wellington; Sir R. Peel's Memoirs*, by his Literary Trustees; *Supplementary Despatches and Memoranda of Field-Marshal Arthur, Duke of Wellington*, edited by his son, the Duke of Wellington, 14 vols. (1858-75); also, in continuation of the above, *Despatches, Correspondence, and Memoranda of Field-Marshal Arthur, Duke of Wellington*, 8 vols. (1867-80).

WELLINGTON COLLEGE: school near Wokingham, Berkshire, England; founded 1853, in memory of the Duke of Wellington, from funds raised by public subscription. It is for education of sons of deceased officers of the army. There are more than 20 masters and about 400 pupils. The foundationers are boarded and educated free of charge; non-foundationers pay £110 per annum.

WELL'MAN, Walter, American journalist and explorer: b. Mentor, O., 1858 Nov. 3. He obtained a secondary education in Michigan, in 1879, established the *Evening Post* of Cincinnati, and from 1884 was political and Washington correspondent of the Chicago *Herald* and *Record-Herald*. In 1892, after investigation of the subject, he located the landing place of Columbus in the New World on Watling Island (San Salvador) in the Bahamas, and built a monument on the spot as he had determined it. He led an expedition to the Arctic regions in 1894, reaching lat. 81°, n.e. of Spitzbergen, and in 1898-9 a second expedition, reaching lat. 82° and discovering many islands. He wintered in Franz Josef Land and in the spring of 1899 made an unsuccessful dash for the pole. In 1899, May, a party directed by E. B. Baldwin, a member of the expedition, discovered Graham Bell Land. Accounts of this second expedition were written by Wellman for the *National Geographical Magazine*, Vol. X. (1899); the *Century Magazine*, new series, Vol. XXXV. (1899); and *McClure's Magazine*, Vol. XIV. (1900).

WELLS, *wĕlz:* ancient city and municipal borough, county of Somerset, England; pleasantly situated at the foot of the Mendip Hills; 15 m. s.w. of Bath. The cathedral, a remarkably beautiful edifice, begun 704, enlarged 1138, is for the most part in Early English; but its w. front, one of the noblest façades in the kingdom, and enriched with 300 statues, is in Gothic. The bishop's palace, founded 1088, is surrounded by a moat supplied from the abundant source of St. Andrew's Well—from which the town is said to derive its name—and by lofty walls. There are no manufactures, and the trade is chiefly retail.—Pop. 4,822.

WELLS, *wĕlz*, Clark Henry: naval officer: 1822, Sept. 22—1888, Jan. 28; b. Reading, Penn. He became midshipman in the U. S. navy 1840; studied at Annapolis, and became passed midshipman in 1846; in the Mexican war served in the fleet that protected Gen. Scott's landing and that bombarded Vera Cruz; took part in the expeditions to Tampico and Tuspan. He was promoted master 1855, Mar., and lieut. Sept., and served on the frigate *Niagara* in laying the first Atlantic telegraph cable. In the civil war he had a share, as executive officer of the *Susquehanna*, in the capture of Port Royal, S. C.; and afterward commanded several boat expeditions in S. C., Ga., and Fla. waters. He became lieut.-commander 1862, July; was executive of the Philadelphia navy-yard 1863, and commanded the steamer *Galena* in the w. Gulf blockading squadron 1863-4. He commanded the *Kansas* on the Brazil station 1865-6; was commissioned commander 1866, July 25; capt. 1871, June 19; commodore 1880, Jan. 22; rear-admiral 1884, Aug. 1; and placed on the retired list 1884, Sept. 22.

WELLS, David Ames, ll.d., d.c.l.: economist: b. Springfield, Mass., 1828, June 17; d. 1898, Nov. 5; lineal descendant of Thomas Welles, governor of Connecticut, and of David Ames, who established the national armory at Springfield. Wells graduated at Williams College 1847; was employed in the editorial office of the Springfield *Republican* 1848; the same year invented a machine for folding newspapers and other printed sheets; entered the Lawrence Scientific School of Harvard, conducted by Louis Agassiz; graduated there 1851, and remained in the institution as assistant. He edited and published at Cambridge, in association with George Bliss, the *Annual of Scientific Discovery* 1849-66. He had a financial interest in the publishing firm of G. P. Putnam & Co., New York, 1857-8. Dr. Wells was for many years a resident of Norwich, Conn. He prepared and published a great number of essays and compilations on economic and other subjects—e.g., *Science of Common Things; Principles*, etc., *of Chemistry; First Principles of Geology; Our Burden and Our Strength* (this had a circulation of about 200,000 copies); *The Creed of the Free-trader; Production and Distribution of Wealth;* and very many more. He served on many important public commissions under federal and state authority. He zealously advocated free trade.

WELLS, Herbert George: English author: b. Bromley, Kent, 1866, Sep. 21. He was educated at the Royal College of Science (South Kensington, London), and published a *Text-Book on Biology* (1892-3), which was followed by *The Time Machine* (1895); *Select Conversations with an Uncle* (1895); *The Wonderful Visit* (1895); *The Island of Dr. Moreau* (1896); *The Wheels of Chance* (1896); *Thirty Strange Stories* (1897); *The Invisible Man* (1897); *The War of the Worlds* (1898); *Tales of Space and Time* (1899); *When the Sleeper Wakes* (1899); *Love and Mr. Lewisham* (1900); *Anticipations* (1901); *The First Men in the Moon* (1901); *Mankind in the Making* (1903); *Twelve Stories and a Dream* (1903); *The Food of the Gods* (1904); *A Modern Utopia* (1905); *In the Days of the Comet* (1906), etc.

WELLS, Horace: dentist: 1815, Jan. 21—1848, Jan. 24; b. Hartford, Vt. He began to study dentistry in Boston 1834, and 1836 began practice in Hartford, Conn. He made experiments to discover an anæsthetic agent for use in his art, and 1840 believed that he had found it in nitrous oxide, yet did not do anything to bring nitrous oxide into general use. Dr. Gardiner Q. Colton administered the gas to several persons at a public lecture in Hartford 1844, and Wells had one of his own teeth extracted by Colton while under the influence of the anæsthetic. He now began to use it in his practice, and in order to introduce it to the notice of physicians, surgeons, etc., throughout the country, communicated to

Drs. William T. G. Morton, Charles T. Jackson, and John C. Warren, all of Boston, the results of his researches. Later, Morton and Jackson claimed the discovery, and applied to the United States government for a patent-right. Despite the protest of Wells, letters patent were duly issued, 1846, November, to Morton and Jackson.

WELLS, WILLIAM: soldier: b. Waterbury, Vt., 1837, Dec. 14; d. 1892, Apr. 29. At the beginning of the civil war he was in mercantile business, but 1861, September, he enlisted in the 1st Vermont cavalry; Oct. 14 was made 1st lieutenant; Nov. 18 promoted captain; and 1862, Oct. 30, major. He served under Banks in his Shenandoah campaign, under Pope in his Virginia campaign; and 1864, Aug.—1865, Mar., with Sheridan in the Shenandoah valley. In 1864, June 4, he was commissioned colonel; 1865, Feb. 22, brevetted brigadier-general; Mar. 30 brevetted major-general; and May 19 received a full commission as brigadier-general. He was mustered out of service 1866, Jan. 15. He afterward served in the legislature of Vermont, and was collector of internal revenue.

WELLS COLLEGE: a college for women, located in Aurora, N. Y. It was founded in 1868 by Henry Wells, who at that time deeded to the trustees the main building and 20 acres of land. It is undenominational in its control and policy. In 1888 the main building was destroyed by fire, but immediately rebuilt without crippling the work of the college. The preparatory course was at first maintained, but was abolished in 1896, when the range of elective system was also greatly increased. The college has now given up taking special students, as the regular applicants exceed the number that can be accommodated. Formerly the three degrees of A.B., B.L. and B.S. were conferred, but the A.B. degree is now granted for the completion of the course, which is largely elective, especially in the last two years. Biblical literature is among the required studies, courses in the theory and history of music count toward the degree, but technical musical work does not. The discipline is by a system of student self government, based on a series of simple rules adopted and enforced by the students themselves. The college is situated on Cayuga Lake, and the College Boat Club has erected a boat house for the use of their members. The college buildings include the main hall, Morgan Hall, a dormitory (the former residence of the founder), a gymnasium, a science hall, and the administration building. The students number 125, the faculty 21. Wells seeks to maintain its distinctive character as a small college, maintaining a high standard of college work, but not attempting university methods.

WELLSBORO, Pa.: borough, county-seat of Tioga co.; on the Fall Brook railroad (New York Central and Hudson River); about 80 m. n. of Williamsport. It is

in an agricultural and coal mining region. It has wagon and carriage factories, marble works, lumber mills, tanneries, and machine shops. There are two banks, the combined capital of which is $150,000. Pop. (1900) 2,954.

WELLS'BURG, W. Va.: city, county-seat of Brooke co.; on the Ohio river, and on the Pittsburg, Cincinnati, Chicago and St. Louis railroad; about 15 m. n. of Wheeling. It is in an agricultural and sheep-raising region, and in the vicinity are numerous coal mines and natural gas. It has a fine city-hall, paper mills, glass factories, a sack factory, grist mill, and machine shop. There are three banks, having a combined capital of $230,000. The place was founded in 1790. Pop. (1900) 2,588; (1910 est.) 2,610.

WELLSTON, Ohio: city in Jackson co.; on the Cincinnati, Hamilton and Dayton, the Ohio Southern, and the Baltimore and Ohio Southwestern railroads; about 72 m. in direct line s.e. of Columbus. It is in an agricultural and coal mining region, and has considerable iron manufacturing. In 1900 (government census) the city had 41 manufactories capitalized at $855,606. The cost of the raw material used annually was $595,415 and the value of the annual products was $1,056,110. The chief industrial establishments are foundries, blast furnaces, barrel factory, machine shops, cement works, and brick works. The city has a high school, public graded schools, and a public library. There are two banks with a combined capital of $85,000. The city owns and operates the electric-light plant and the water-works. The government is vested in a mayor who holds office two years and a city council. The place was settled in 1871 and in 1876 was incorporated. Pop. (1910) 6,875.

WELLS'VILLE, N. Y.: village in Allegany co.; on the Genesee river, and on the Erie and the Buffalo and Southern railroads; about 25 m. s.w. of Hornellsville. It is in an agricultural and dairy region, and in the vicinity are a number of oil wells. It has foundries, machine shops, creameries, flour mill, tanneries, and cigar factories. There are two national banks with a combined capital of $150,000. It has a high school, graded elementary schools, and a public library. Pop. (1910) 4,382.

WELLSVILLE, Ohio: city in Columbiana co.; on the Ohio river, and on the Pennsylvania railroad; about 85 m. s.w. of Cleveland. It is in an agricultural and coal mining region, and in the vicinity are valuable deposits of fire clay. The chief manufacturing establishments are machine shops, foundries, iron and steel works, brick and tile works, potteries, nail factory, boiler works, and railroad shops. In 1900 (government census) there were 61 manufacturing establishments, which were capitalized for $1,233,863, and whose annual finished products brought $1,548,190. There are three banks; the two na-

tional banks have a combined capital of $150,000. There are nine churches, a high school, public and parish schools, and a public library. The city owns and operates the water-works. Pop. (1910) 7,769.

WELSBACH LIGHT: an invention of Carl Auer von Welsbach, an Austrian, in 1884. In Europe it is known as the Auer light. It is based upon the discovery that certain materials become incandescent at a low temperature. The process followed is to saturate a combustible filament in the form of a network with a solution of a salt of a refractory earth, such as zirconium. It is then dried out and burned, the combustible element disappearing and leaving a frame of refractory material, which becomes incandescent at a low temperature.

WELSER, *vĕl'sẽr:* famous extinct patrician family in Augsburg.—Julius Welser was knighted by Emperor Otto I. for his services in the war against the Hungarians.—His son Octavian Welser settled in Augsburg, and from him descended the patrician family, which always held important posts in the council of that town.—Bartholomew Welser, privy councilor of Emperor Charles V., was so wealthy that he could vie with the Fuggers in munificence. With the emperor's permission, 1526, he fitted out three ships in Spain, which, under command of Ambrose Dalfinger, of Ulm, sailed for America, and took possession of the province of Caracas, which the emperor gave Welser in pledge. Twenty years after this, the Welsers gave up their possession voluntarily, and it reverted to Spain.—The most famous of the family was the niece of Bartholomew Welser, Philippine Welser, daughter of his brother Franz Welser (about 1530-80). She had received an excellent education from her mother, and was exceedingly beautiful. On the occasion of a diet of the empire at Augsburg 1547, she was seen by Archduke Ferdinand (second son of the subsequent emperor, Ferdinand I.), who fell in love with her. The young girl firmly rejected all the advances of this fiery youth of 19, and refused any relation with him except marriage. They were therefore married 1550, without the knowledge of his father, or of his uncle, Charles V. His father, hearing of the marriage, was exceedingly angry, and for a long time his son did not venture to appear before him. Meanwhile the loving couple had great domestic happiness, and Philippine enchanted every one that knew her by her intelligence and kindness of heart. It was only after eight years that his father was reconciled. Philippine, in disguise, herself handed him a petition, and by her deportment on the occasion, as well as her beauty, disarmed the angry father: he forgave his son, declared his children legitimate, and raised their mother to be Markgravin von Burgau. The portrait of the lovely Philippine is still shown in the palace at Schönbrunn.

WELSH, a. *wĕlsh* [AS *wealh*, foreign: OHG. *walah*, a foreigner]: of or pertaining to Wales or its people: N. the people of Wales or their language. WELSH POPPY, a yellow flower, *Meconopsis cambrica*, natural order *Papaverăcĕæ*. WELSH-RABBIT [corruption of *Welsh rare-bit*]: melted cheese laid on toasted bread and highly seasoned.

WELSH, HERBERT: helper of the Amer. Indians: b. Philadelphia, 1851; son of John W., U. S. minister to England. He graduated at the Univ. of Penn. 1871. He has since devoted much time to the study of the Indian question, writing and lecturing on the legal and social position of the Indians, and advocating their rights under the government. Through his efforts the National Indian Rights Assoc. was established in Philadelphia 1883, of which he is secretary. In this official position he was instrumental in obtaining the appropriation for the starving Piegans of Montana 1885. He also succeeded in having revoked the order of Sec. Teller opening to settlement the Crow Creek and Old Winnebago reservations. At numerous points, for many years, he has stood as a watchful and courageous guardian of an almost friendless race.

WELSH, JOHN: merchant: 1805, Nov. 9—1886, Apr. 10; b. Philadelphia. He received a liberal though not collegiate education, and a good business training in his father's counting-house. In 1854 he entered into partnership with his two brothers in the W. India sugar-trade, and was the senior member of the firm at his death. He held many positions of honor and trust in Philadelphia, among them chairman of the finance committee of the Centennial Exhibition. For his valuable services in this position, the citizens of Philadelphia gave him a gold medal, and gave $50,000 to endow the John Welsh centennial professorship of hist. and Eng. lit. in the Univ. of Penn. In 1877 Pres. Hayes appointed him minister to England, but he resigned in 1879. He died in Philadelphia.—His brother WILLIAM W., merchant (1810–78), b. Philadelphia, was prominent in philanthropic and reformatory efforts in the city; was a member of the Indian peace commission during Grant's administration, and pub. works on the Indian question and on Episc. church work.

WELSH, THOMAS: soldier: 1824, May 5—1863, Aug. 14; b. Columbia, Penn. At the beginning of the Mexican war he enlisted as a private, but was promoted lieut. for gallantry on the field at Buena Vista, where he was wounded. At the three months' call for troops in the civil war he entered the service as capt., but was elected lieut.-col. of the 2d Penn. regt. At the expiration of the three months he re-entered the service as col. of the 45th Penn. regt. He commanded a brigade at South Mountain, Antietam, and at Fredericksburg. For his services at Fredericksburg he was commissioned brig.-gen. of vols. He was subsequently transferred to the west with the 9th army corps, and took part in the siege of Vicksburg. He died at Cincinnati, O., from malarial fever, while on his way home after the fall of Vicksburg.

WELSHER: see WELCHER.

WELSH LANGUAGE AND LITERATURE: the language and literature of the people of Wales (q.v.), and of the ancient Britons from whom they are sprung. Celtic languages are divided into two groups, Gaelic and Cymric. To the latter of these the Welsh belongs, and has even given name, as forming the most important member of the group; which comprises also Armorican (spoken in Bretagne) and Cornish (extinct). A controversy has been waged concerning the nature and closeness of the intimacy between the Gaelic and Cymric tongues, but the question may be considered settled by the researches of the Rev. Richard Garnett (*Gentleman's Magazine*, 1839, May), who found, on examining the monosyllabic words in the introductory part of Neilson's *Irish Grammar*, that, out of 270, no fewer than 140 were identical in sense and origin with corresponding Welsh terms, that 40 were cognate, 40 others borrowed from Latin, Saxon, etc., and that only 50 were peculiar to the Gaelic. Nevertheless, it is not to be supposed that the affinity is as close as between English and so-called Scotch: it is rather (according to Garnett) such as exists between Icelandic and German. A Welshman cannot understand a Highlander or an Irishman; he cannot understand even a Breton (as used to be believed), though the language of the latter is undoubtedly Cymric. Extraordinary hallucinations were formerly current in regard to the antiquity of the Cymric tongues. Pezron, Breton investigator, gravely affirmed that Welsh and Armoric (which he considered the same) had been 'the language of the Titans—i.e., the language of Saturn, Jupiter, and the other principal gods of heathen antiquity.' The Rev. Joseph Harris, ed. of the *Seren Gomer*, remarked 1814 that 'it is supposed by some, and no one can disprove it, that Welsh was the language spoken by Adam and Eve in Paradise.' The *fact*, on the other hand, is, that, of the two branches of Celtic, the Cymric is less ancient than the Gaelic, and that among the Cymric tongues the Cornish is probably older than the Welsh. (See Norris, *Ancient Cornish Drama*, Oxford 1859). Still, doubtless the Welsh is one of the oldest living languages in Europe, and possesses a literature reaching back to remoter times than that of any other modern tongue except Irish. The most striking peculiarities of the language are the abundance of its grammatical permutations, and its facility in forming derivatives and compounds. Of the former, two examples may serve for illustration. The Welsh word for 'father' is *tad;* for 'my,' *fy*. But you cannot say, as meaning 'my father,' *fy tad*. After *fy*, every word beginning with *t* must change the *t* to *nh;* and therefore the correct phrase is *fy nhad*. So after *ei*, *tad* becomes either *dad* or *thad*, according as *ei* means 'his' or 'her.' The rules of permutation are almost endless; and, in the opinion of such Welsh scholars as are not Welshmen, useless, as nothing is gained in euphony or expressiveness. The Welsh affirm that their language is exceeding harmonious, and it would serve no good purpose to dispute the assertion, but foreigners ignorant of the tongue, and associating no defi-

nite ideas with the words that issue from a Welshman's lips, generally fail to perceive the fact, and consider it in this respect—though not in others—distinctly inferior to Gaelic. The language, or rather the structure of sentences and the phraseology, exhibits a certain stateliness, or even grandiloquence, characteristic, indeed, of uncivilized nations. Specially noticeable is the fact that the Welsh people are profoundly attached to and familiar with it. It is not dying out, like Irish or Scotch Gaelic. It has a genuine literary as well as oral existence even now; and though the changes that it has undergone since the days of Taliesin are numerous and great—so great, indeed, that no modern unlettered Cambrian can understand a word of the early poetry of his country—yet it is essentially the same tongue as Cæsar and Agricola heard, and is consequently to be regarded with veneration as the solitary living link that unites those distant ages with our own.

There are extant, says Owen Pughe, about 30 old treatises on Welsh grammar and prosody. The most important was by Geraint (880), revised by Einion (1200), and regularly privileged by the sovereigns who then exercised authority in Wales. It was printed first by the Welsh MS. Soc., 1856, under the editorship of the Rev. J. Williams ab Ithel. Among Eng. grammars of the Welsh language, the best is said to be that by the Rev. Thomas Rowland (2d ed. 1857); among dictionaries, that of Owen Pughe, entitled *Geiriddur Cymraeg a Saesoneg, a Welsh and English Dictionary*, 2 vols. (1793; 3d ed. 1861, *et seq.*). It is, however, only a Welsh-Eng. dictionary; the most satisfactory Eng.-Welsh dictionary was pub. by Daniel Silvan Evans, 2 vols. (Denbigh 1852–58).

The literature of Wales has been arranged into four periods—the *first*, from the earliest times to the Norman Conquest (1066); the *second*, from the Norman Conquest to the Eng. Reformation (about 1536); the *third*, from the Eng. Reformation to the beginning of the reign of George III. (1760); the *fourth*, from 1760 to the present day.—To what date the oldest specimens of Welsh literature ought to be assigned, has been the subject of sharp dispute. These specimens are in verse, rhymed. The chief of their alleged authors, with their supposed periods, are Aneurin (510–560), Taliesin (520–570), Llywarch *Hen*, or 'the Old' (550–640), and Myrddin or Merlin (530–600). According to Pinkerton (see his preface to *Barbour*) and Laing (*Dissertation on Ossian*), they are not authentic; but the vindication of their authenticity, first by Sharon Turner 1803, afterward more critically by Stephens of Merthyr-Tydvil, in *Literature of the Kymry* (1849), and by Nash, in *Taliesin, or the Bards and Druids of Britain* (1858), is considered conclusive. The last two of these writers, however, may almost be said to meet their opponents half-way. Of the 77 poems ascribed to Taliesin in the *Myvyrian Archaiology of Wales* (collection of all the most celebrated works in Welsh literature, 500–1400), which appeared 1801, Stephens considers 57 demonstrably spurious, and only 12 probably genuine—i.e., belonging to the age of Taliesin.

Nash enables us to form an independent judgment on the point, for he translates about 50 of these poems, and we find that, instead of their exhibiting an antique Welsh character, they abound in allusions to mediæval theology, and frequently employ mediæval Latin terms. It is unfortunate for the reputation of the 'Chief of the Bards' that the specimens of his which *are* considered genuine possess exceedingly small poetic merit. The life of this famous but apparently overrated genius is enveloped in legend. He is said to have been son of a certain St. Henwg, and to have been educated at the College of St. Cadog. His life was spent successively at the courts of Urien Rheged, Gwyddno, Prince of Cardigan, and King Arthur; and his sepulchre, shown near Aberystwith, is still called *Bedd Taliesin* (Taliesin's Grave). Of the poems whose authorship is ascribed to Aneurin, prince of the Cumbrian Britons, the most notable is that entitled *Gododin*, in which he pathetically laments a defeat of his countrymen by the Saxons: it is reckoned authentic. (Several Eng. translations of the *Gododin* have been pub., and a transl. of the works of Aneurin was pub. by Probert 1820.) Llywarch Hen, also a Cumbrian warrior, is regarded as the finest and most poetical of all the semi-historical Welsh bards: tradition reports that he lived to the age of 150. The burden of his verse is the miseries of old age, on which he descants with melancholy eloquence. (See *The Heroic Elegies and other Pieces of Llywarch Hen, Prince of the Cumbrian Britons*, with literal transl. by William Owen, 1792.) The pieces ascribed to Merddyn in the *Myvyrian Archaiology* are probably spurious. Besides the names above, other poets of the first period are Gwyddno, Gwilym ab Don, Golyddan, etc.

The earliest specimen of Welsh prose extant is the collection of the laws of King Hywel Dda, or Howel the Good (d. 748)—of great value in illustrating the manners and morals of early Welsh times; but it is very uncertain when or by whom the collection was made. The oldest extant MS. belongs to the 12th c. The latest and most critical ed. (Welsh and Eng.) was pub. 1841 by the Record Commission, and edited by Aneurin Owen, son of Dr. Owen Pughe. Another work, *The Wisdom of Cadog the Wise* (collection of proverbs pretending to be by a St. Cadog, 6th c., a friend of Taliesin), is of doubtful authenticity.

Second Period (1066–1536).—A few years after the Norman Conquest, a new spirit was imported into Welsh poetry by the influence of Gruffydd ab Cynan, Prince of N. Wales, and Rhys ab Tewdwr, Prince of S. Wales. Gruffydd, b. during his father's exile in Ireland, was brought up in that country, where he appears to have acquired familiarity with both the native Celtic literature and that of the Dano-Norse invaders. In 1100 he held a great Eisteddvod at Caerwys, in N. Wales, numerously attended by Irish bards and musicians. For the next 300 years, Wales is rich in native bards—a fact that conclusively refutes the tragic story of Edward I. having caused

them all to be slain, lest their patriotic songs should stir the Welsh to renew the struggle for independence. Nearly 60 names occur in the *Myvyrian Archaiology* 1120–1380. The first is that of Meilyr (1120–60), whose best piece is *The Deathbed of the Bard.* Meilyr's son, Gwalchmai ab Meilyr (1150–90), said to have accompanied Richard Cœur de Lion to Palestine, is a superior poet to his father: 14 of his productions are extant. Gwalchmai's son, Einion (1170–1220), also figures as a poet. Forty pieces are ascribed to Cynddelw (1150–1206), contemporary of Gwalchmai, of which probably the most interesting is *The Deathbed of Cynddelw.* He has also some verses addressed to Prince Madog or Madoc of Powys, whom enthusiastic Welshmen conceive to have discovered America before Columbus. Other bards of this second period are Llywarch ab Llewellyn (1160–1220); Hywel (1140–70), brother of Prince Madoc, and writer chiefly of erotic odes: Owain Cyveilioc (1150–97), also of princely rank, whose *Hirlas*, or the *Long Blue Horn*, is a favorite with Welshmen and with others; and above all, *Davydd ab Gwilym* (about 1340–1400), who has been compared to Ovid, to Petrarch, and to Burns. In his verses, Welsh poetry undergoes a change—the bardic or Scaldic spirit disappears, and a more humane, if less patriotic, spirit takes its place. Davydd sings of love and social amusements; he was likewise a fierce satirist, though at times very penitent and pious; while, to complete his resemblance to the Scottish poet, he showed predilection for illicit love. Davydd's poems were published in Welsh first, with a biography of the author by Owen Jones and Owen Pughe (1789). An Eng. translation of some by A. Johnes appeared 1834. Besides the poets above mentioned, the following names are in high repute: Iolo Goch, friend and bard of the famous Owen Glendower, who is said to have lived to the age of 120; Sion Cent ('John of Kent') (1380–1410), who, having adopted the opinions of the Lollards, ultimately attained the reputation of a wizard; and Lewis Glyn Cothi, who lived during the Wars of the Roses, and was bard to Jasper, Earl of Pembroke, son of Owen Tudor and of the widow of Henry V.

Prose.—The oldest Welsh chronicler of the second period is Caradoc, monk of Llancarvan, first half of the 12th c. His work narrates in Welsh the history of his native country from the death of Cadwallader, 689, to the times of Caradoc himself: it is dry and illiterate, like the Anglo-Saxon Chronicle. Contemporary with Caradoc was the famous Geoffrey of Monmouth (q.v.), Bp. of St. Asaph: d. 1154. He, however, though a Welshman, wrote in Latin, and belongs, therefore, rather to the general literature of England. His *Chronicle* begins with the fall of Troy, and ends with the death of Cadwallader, so that it forms an introduction to that of his friend Caradoc. In it the legend of Arthur first assumes that romantic and chivalrous form in which modern readers are familiar with it. It is impossible here to enter into a discussion of the question where the materials of the Arthurian romance were first accu-

mulated; suffice it to say, that evidence preponderates in favor of their Welsh origin. To this *second* period must be assigned also that charming collection, the *Mabinogion*, or Children's Tales, of which a MS. vol. of more than 700 pages is in the library of Jesus College, Oxford, and is known as the *Red Book of Hergest*, from the place where it was discovered. A beautiful ed. of this work in Welsh and Eng., with preface and notes, was pub., 3 vols. (1838–49), by Lady Charlotte Guest. The age of these tales, which relate principally to Arthur and the Round Table, is doubtful. The transcription in the *Red Book of Hergest* belongs probably to the 15th c.; but the date of their composition may be safely fixed much earlier, perhaps in the 13th century.

The *Triads* also may be here noticed: they are collections of historical facts, maxims ethical and legal, mythological doctrines and traditions, and rules for the structure of verse; all expressed with extreme brevity, and regularly disposed in groups of three. They were a very popular species of composition among the Welsh, and are of all ages. Examples occur in the poems of Llywarch Hen, but the greater part are found in transcripts and miscellanies of the 16th and 17th c. The 'historical' triads are especially puzzling. They occur in a so-called collection by Thomas Jones of Tregaron, about the close of the 16th c. This Jones was originally, it seems, an eminent robber—a Welsh 'Rob Roy;' but in his later years he reformed, married an heiress, became a justice-of-peace for the county of Brecon, and d. about 1620. The peculiarity of his 'Collection' is, that it gives a totally different account of the origin of the Britons from Geoffrey of Monmouth, bringing them from a 'Summer Land' (supposed to be Constantinople or the Crimea) over a sea called the 'Hazy Sea.' The question arises, and has not been settled, whether we are to suppose Jones the fabricator of these 'triads,' or his account of the origin of the Britons the genuine record of an ancient tradition. In favor of the former hypothesis, unfortunately, is the circumstance that there is no trace of such an ancient tradition in the anterior literature of Wales.

Third Period (1536–1760).—The most notable fact in the beginning of this period is the comparative ease with which the Reformation made its way among the Celts of Wales. The Celts of the Highlands remained for a time, and those of Ireland remain to this day, obdurate adherents of the old faith; but those of Wales, on the whole, swiftly accepted the new religion. The art of printing had been in operation in England more than half a century before it was applied to the Welsh language. The first book printed in the Welsh or any Celtic language was an almanac, with translation of the Lord's Prayer and the Ten Commandments (Lond. 1546). The author, William Salesbury, was a scholar and a zealous Protestant. In 1547 he pub. the first dictionary of English and Welsh, and executed the greater part of the first transl. of the New Test. into his native tongue (Lond. 1567). In 1588 appeared the earliest transl. of the whole Bible into Welsh.

The author was Dr. William Morgan, afterward Bp. of St. Asaph. A revised ed., 1620, by Dr. Parry, Morgan's successor in St. Asaph, is the transl. still in use among the natives of the principality. Contemporary with Salesbury, but an adherent of the old faith, was Dr. Griffith Roberts, who lived on the continent and pub. at Milan a Welsh Grammar 1567. Another contemporary was Dr. John David Rhys, whose principal work, *Cambrobrytannicæ Cymræcæve Linguæ Institutiones et Rudimenta*, is a treatise on Welsh grammar. In 1603 Capt. Myddleton, one of the first three persons who smoked tobacco in England, published a metrical version of the Psalms in Welsh, partly executed while cruising in the W. Indies. The most celebrated poets of the *third* period are: the Rev. Rees Prichard, vicar of Llandovery (1579–1644), whose *Canwyll y Cymry* (Candle of the Cambrians) is a metrical version of his professional homilies or sermons, the eloquence of which had previously won for him a great reputation as a preacher—it is still popular, the 20th ed. having appeared as late as 1858; Huw Morus, or Hugh Morris (1622–1709), author of a variety of pieces, which his countrymen consider unsurpassed in humor, pathos, and even sublimity—ed. in 2 vols. (Wrexham 1823), under the title *Eos Ceiriog* (The Nightingale of Ceiriog); and Goronwy Owen (1722—about 1780), a gifted bard, but an incurable drunkard, whose principal poems are in the first vol. of a book, *Diddanwch Teuluaidd* (Domestic Amusement, Lond. 1763). Of the prose writers, the only noteworthy are Ellis Wynne (d 1734), author of the *Bardd Cwsg* (Sleeping Bard, 1703), a series of visions of Hell and Hades, written with great beauty of style; and the Rev. Moses Williams (1685–1742), an antiquarian scholar of high merit, whose *Repertorium Poeticum*, or List of Welsh Poems and Catalogue of Welsh Books, is very valuable.

Fourth Period (1760 to present time).—Various causes gave new impetus to Welsh literature after the accession of George III. Among these, the most powerful were the establishment of periodical publications, the institution of patriotic societies, and the spread of Methodism. The first important production of this period is *Some Specimens of the Poetry of the Ancient Welsh Bards translated into English* (Lond. 1764), by Mr. Evans, curate of Llanvair Talyhaern, in Denbighshire. The next name deserving of mention is that of Owen Jones (1741–1814), who, though engaged in mercantile occupations all his life, managed, by enthusiasm and liberality, to quicken and extend the public interest in Welsh literature. In 1771 he founded the *Gwyneddigion* (society of the 'Men of Gwynedd'), which gave prizes for the best performances on the Welsh harp and the best Welsh poems: 1801–07 he caused to be published at his own expense, under editorship of Owen Pughe and Edward Williams, three vols. of the *Myvyrian Archaiology*, so called in honor of himself, who had assumed the bardic name Myvyr, from his native vale in Denbigh. Owen Jones was, however, rather a Welsh Mæcenas than a Welsh *litterateur*. The next names of

importance are those of the editors above mentioned, Owen Pughe and Edward Williams. The former (1759–1835), according to Southey, was a 'muddy-minded man;' nor is the fact that he was a follower of Joanna Southcott, and one of her 24 elders, adverse to this description of his intellect. Be this as it may, Owen Pughe is the great Welsh lexicographer; his dictionary of Welsh (1793–1803) contains 100,000 words, illustrated by 12,000 quotations. He also translated *Paradise Lost* into Welsh, in which work he threw off the chains of Welsh alliteration—an innovation generally acknowledged to be an improvement. Edward Williams (1745–1826), better known as Iolo Morganwg, is probably the finest Welsh genius of the fourth period: Southey knew him, and liked him greatly. His principal productions are *Salmau yr Eglwys yn yr Anialwch* (Psalms of the Church in the Desert); but an *Ode on the Mythology of the Ancient British Bards in the Manner of Taliesin* (1792), accompanied by notes and specimens of 'Triads,' containing the metaphysical and religious doctrines of the old Druidical bards, provoked a long-protracted controversy. Morganwg said that he had copied them from a MS. collection of a Welsh poet, *anno* 1560, which was in his possession, and affirmed that the collection was of very great antiquity. He was often asked to produce it, but always declined; and Welsh critics of the stricter sort have ceased to believe in its existence. The three associates in the publication of the *Myvyrian Archaiology* had each one son, and all of these have become eminent in connection with the literature of their native country. Taliesin Williams (1787–1847), son of Edward Williams, wrote poetry in Welsh and English; Aneurin Owen (1792–1851), son of Owen Pughe, among other works pub. an important collection of the *Laws of Wales;* and Owen Jones (d. 1874), son of Owen Jones the Welsh Mæcenas, had high reputation as an architect, the Alhambra at Sydenham being a favorable specimen of his professional talents. The fourth period of Welsh literature is naturally richer in critical than in creative works. Among Welsh antiquaries are: the Rev. Edward Davies (1756–1831), author of *Celtic Researches* (1804) and *Mythology of the Druids* (1809); the Rev. Thomas Price (1787–1848), author of the *Hanes Cymru a Chenedl y Cymry* (1836–42), a history of Wales and of the Welsh nation from the earliest times to the death of Llewelyn—an admirable work, comprehensive, critical, and literary (Price was an ardent and voluminous writer, contributing to 15 periodicals at the same time); and the Rev. John Williams ab Ithel, rector of Llanymowddwy, in Merioneth, and ed. of the *Cambrian Journal.* In 1856 he edited, for the Welsh MS. Soc., the *Grammar of Edeyrn, the Golden-tongued,* said to be composed about 1270; in 1860, the *Brut y Tywyrogion,* or Chronicle of the Princes; and in 1861 (*et seq.*) *The Traditionary Annals of the Cymry*, reprinted from the *Cambrian Journal.* Williams, though a rather credulous and uncritical writer, is a scholar of undoubted merit. Probably the ablest recent Welsh scholar was the late Thomas Stephens of Merthyr-Tydvil—patriotic and

honest, enthusiastic and critical: he, above all others, is to be consulted by those seeking some clear knowledge of Welsh literature. His principal works are *Studies on British Biography*, and *Literature of the Cymry in the Twelfth and following Centuries*. The enlightened views of Stephens have met with great acceptance among Eng. scholars in this department.

The poetry of the fourth period is not remarkable. The principal names are: David Richards of Dolgelly (1751–1827), author of a sort of epic on the unsuitable theme of the Trinity, and of a paraphrase of the history of Joseph; David Thomas of Caernarvon (1769–1822), very successful at the Eisteddfods; David Owen of Givion (1784–1841), whose poems were collected and published under the title *Blodau Arfon* (Flowers of Arvon); the Rev. Daniel Evans, a collection of whose pieces was pub. at Llandovery 1831, under the title *Gwinllan y Bardd* (The Poet's Vineyard); the Rev. Walter Davies (1761–1849), also great at Eisteddfods; the Rev. James Hughes (1779–1846); the Rev. William Rees of Liverpool, author of a spirited paraphrase of the Book of Job, etc.; and the Rev. William Williams of Caernarvon, author of *Grawn Awen* (The Treasure of the Muse), etc.

Passing by the mediocre Welsh prose written during this period on religious subjects, owing to the spread of Methodism among the Welsh, we glance at the history of Welsh periodicals and societies. The first Welsh periodical, ed. by the Rev. P. Williams and Evan Thomas, appeared about 1770, entitled *Yr Eurgrawn Cymraeg* (The Welsh Treasure); but the first that attained success was the *Seren Gomer* (Star of Gomer), pub. at Swansea (1814). In 1831 *Y Drysorfa* (The Treasury) was begun, under Calvinistic auspices; 1836, *Y Diwygiwr* (The Reformer) and *Y Dysgedydd* (The Teacher); 1833–41, *Y Gwladgarwr* (The Patriot), more a literary than a theological magazine; *Yr Haul* (The Sun), journal advocating the interests of the Established Church; and *Y Traethodydd* (The Essayist), begun at Denbigh (1845), distinctly the best literary organ in Wales. In 1879 more than 60 daily or weekly newspapers appeared in the principality; of these about a dozen were pub. in Welsh. There are about the same number of monthly or weekly magazines or periodicals, helping to keep alive the ancient speech; and two quarterlies in the Welsh language, on general subjects. There are also Welsh magazines conducted in English. The *Cambrian Register*, the *Cambro-Briton*, the *Cambrian Quarterly Magazine*, and the *Cambrian Journal*, dealt almost exclusively with Welsh subjects. A Welsh encyclopedia (*Encyclopædia Cambrensis—Y Gwyddoniadur Cymreig*) was begun under editorship of the Rev. John Parry of Bala, 1856. The *Archæologia Cambrensis*, the journal of the Cambrian Archæological Assoc., began to appear 1846. The *Enwogion Cymru* (1862) of the Rev. Robert Williams is a useful biographical dictionary of eminent Welshmen.

The leading Welsh societies, literary and antiquarian, that have existed or still exist, are the Cymmrodorion (Lon-

don, 1751-81); a second Cymmrodorion (1820-43); the Society for Publication of Ancient Welsh Manuscript (founded Abergavenny 1837); and the Cambrian Institute (founded 1853). The Eisteddfod, the annual national 'sitting' for the encouragement of bardism, music, and general literature, dates from the end of the 4th century: its meeting lasts three or four days, a president and conductor are appointed for each day, and it is attended by thousands of persons of all classes. Prizes and medals are given for the best poetical, musical, and prose compositions, for the best choral and solo singing, and singing with the harp. On the last day the great event of 'chairing' the fortunate bard takes place.

WELSH ONION, or CIBOL, *sĭb'ol* (*Allium fistulosum:* see ALLIUM): perennial plant, native of Siberia; with fistular leaves and no bulb. Its leaves appear very early in spring, and are then used in soups and salads. Its flavor resembles that of garlic more than of the onion. It has long been cultivated in kitchen-gardens in Great Britain: the seed is sown in spring or summer; leaves fit for use are produced in the following spring, and the bed continues productive for years. The epithet *Welsh* is from the German *Wälsch,* and merely indicates a foreign origin.

WELT, n. *wĕlt* [W. *gwald,* a hem: Gael. *balt,* a border, welt of a shoe]: cord covered with cloth and sewed on seams or borders to strengthen them; a strip of leather sewed round the edge of the upper of a boot or shoe and the inner sole, and to which the outer sole is afterward secured; a selvage or edging; a low ridge or swelling on the surface of the skin, such as might be caused by a blow with a whip; a weal or wale: V. to sew, as a welt on a border or a shoe. WELT'ING, imp.: N. the act of sewing on a welt; the material used. WELT'ED, pp.

WELTER, v. *wĕl'tėr* [AS. *wealtan;* Dan. *vælte;* Low Ger. *weltern;* Ger. *wälzen;* Sw. *wältra,* to roll, to wallow]: to roll or wallow in something foul or liquid; to tumble up and down: N. a mess; a state of confusion. WEL'TERING, imp. WEL'TERED, pp. *-tėrd.* WELTER RACE, or WELTER STAKES [corrupted from *swelter*]: a race in which the horses carry the heaviest weights.

WELWITSCHIA: a genus of plants of the order *Gnetaceæ,* containing only one species, *W. mirabilis.* This species is confined to the deserts of southwest Africa, where it was discovered in 1860 by Friedrich Welwitsch. It has a short and top-shaped stem which never grows much above the surface, but increases in thickness, until it may be 3 ft. in diameter, and bears a pair of large opposite leaves. These leaves last throughout the whole lifetime of the plant, and become ultimately torn up longitudinally into long strips, which trail on the surface of the ground. Two cotyledons which are like short-

lived leaves of much smaller size precede them. The flowers of the plant grow in cones like those of many conifers, the cones being arranged in panicles on the end of the stem between the two leaves. The female cones are much larger than the male ones, and in fruit are of a scarlet color.

WEN, n. *wĕn* [AS. *wenn;* Dut. *wen;* Low Ger. *ween,* a swelling, a wart]: a circumscribed, indolent, fleshy tumor in which there is no inflammation and no discoloration of the skin—affecting the face, head, or neck. WEN'NY, a. *-nĭ,* or WEN'NISH, a. *-nĭsh,* having the nature of a wen.—*Wens* consist of obstructed sebaceous glands, which enlarge by internal pressure of their accumulated secretions. The closed orifice may be often noticed in the form of a small dark point, and in that case the duct may sometimes be gradually enlarged by gentle introduction of a probe or director, and its contents pressed out. By this treatment the wen may, at all events, be kept from being unsightly, and will sometimes shrivel up and disappear. If this treatment fail, and the patient finds the tumor so annoying that he insists on its removal, it must be removed with the knife.

WENCESLAS, or WENZEL: Emperor of Germany and King of Bohemia: b. 1361; d. Schlagfluss 1419, Aug. 16. He was the son of Charles IV., whom he succeeded in 1378. In 1394 the Bohemian nobility formed a conspiracy against him and held him prisoner at Prague, but later released him. Through the influence of the archbishop of Mainz, whose enmity he had aroused by demanding the resignation of the rival popes, Benedict XIII. and Boniface IX., he was deposed by the imperial electors, while the Elector Palatine Rupert was chosen to succeed him. In Bohemia he supported John Huss and the latter's party, and in 1409 compelled by a decree the departure of the Germans from the University of Prague. Shortly afterward he resigned the royal title.

WENCH, n. *wĕnch* [OE. *wenche, wenchel*—from AS. *wencle,* a maid; *winclo,* children; *wencel,* weak—the original sense of *wench* seems to have been 'infant': prov. Ger. *wankel,* tottering, unsteady]: a depreciatory or familiar term for a young woman; a woman of ill fame: V. to frequent the society of loose women. WENCH'ING, imp.: N. the habit of frequenting the company of loose women. WENCH'LESS, a. *-lĕs,* having no loose women to associate with. WENCHED, pp. *wĕncht.* WENCH'ER, n. *-ẽr,* one who frequents the society of loose women.

WEN-CHOW, China: a treaty port in the province of Che-kiang, on the estuary of the Ta-kai river, flowing into the China Sea; about 200 m. s. by w. of Shanghai. Ruined palaces, gates, and triumphal arches are among the numerous signs of its vanished greatness, but it is still a comparatively clean town, with broad streets.

Among buildings of recent erection are the custom-house and the branch of the imperial Chinese postoffice. The chief imports are cottons, kerosene, sugar, opium, iron, and woolens; the principal exports are tea, umbrellas, timber, and oranges. The average annual values of the imports and exports during several recent years were about $850,000 and $290,000 respectively. The tonnage of shipping entered in 1901 was 26,044. There is also a considerable junk trade. Pop. about 80,000.

WEND, v. *wĕnd* [AS. *wendan,* to turn, to go: Dan. *vende;* Icel. *venda;* Dut. and Ger. *wenden,* to turn]: to go; to pass on along; to proceed on, generally used in phrase to *wend* one's way: N. in *OE.,* a large extent of ground; a circuit. WEND'ING, imp. WEND'ED, pp.

WEN'DELL, BARRETT: American educator and author: b. Boston, Mass., 1855, Aug. 23. Graduated from Harvard in 1877, he studied also in the Harvard Law School, in 1880-8 was instructor in English at Harvard, in 1888-98 assistant professor, and in 1898 became professor. He was Clark lecturer at Trinity College, Cambridge, England, in 1902. Among his works are: *The Duchess Emilia* (1885); *Rankell's Remains* (1897); *English Composition* (1891); *Cotton Mather* (1891); *Stelligeri, and Other Essays Concerning America* (1893); *William Shakespere* (1894); *A Literary History of America* (1900; in the *Library of Literary History*), a scholarly work, though much criticised for its unjust attitude toward certain writers; and *Raleigh in Guiana* (1902), an attempt at imitation of the Elizabethan drama. He also contributed the interesting chapter on *The American Intellect,* to Vol. VII., *The United States,* of the *Cambridge Modern History.*

WENDS: a former powerful Slavic tribe settled in Germany, now represented by the Slavic people of Upper and Lower Lusatia, who call themselves Serbs (*Serbjo*), whence the name Sorbs, often applied to them by German authorities. In the earliest historical times the Sorbs occupied the country from the Saale to the Bober, and from the latitude of Berlin south to the Erzgebirge; but the Wends are now confined to a small territory (about 1,270 sq.m.) in the upper Spree valley, extending from south of Bautzen to north of Kottbus. The larger part of this Wendish region belongs to the Prussian provinces of Brandenburg and Silesia, the smaller southern part being included in the kingdom of Saxony (circle of Bautzen). The Wends are completely surrounded by Germans, and being thus cut off from contact with the other Slavs, they are becoming slowly Germanized. Their language, known as Sorbian, falls into two dialects, Upper and Lower Sorbian, which are spoken in the south and the north of the territory respectively. (See WEND LANGUAGE.) The total number of Wends is about 120,000, of whom about 50,000 live in Saxony and 70,000 in Prussia. About 12,000 are Ro-

man Catholics, and the remainder being chiefly Lutherans.

WENER, *vā'nėr*, LAKE: largest lake in the Scandinavian peninsula, and, after the lakes Ladoga and Onega in Russia, the largest in Europe; 150 m. w.s.w. of Stockholm, and about 30 m. inland from the Cattegat. It is more than 90 m. long, and 15 to 48 m. wide; 309 ft. in greatest depth, and 150 ft. above sea-level; 2,005 sq.m. From the n. shore a peninsula extends s. into the middle of the lake; and from the s. shore a peninsula extends n. to within about 15 m. of the point of the n. peninsula: the portion of the lake w. of these peninsulas receives the name Dalbo Lake. Of the numerous rivers that feed the lake the chief is the Klar, from the n., and its surplus waters are discharged into the Cattegat by the river Göta. Lake Wener is connected by a canal with Lake Wetter, by means of which, the Göta canal, Lake Roxen, etc., inland communication is established between the Cattegat and the Baltic Sea. The lake is rich in fish; it is often visited by sudden gusts of wind, and is in many places too shallow for navigation.

WENLOCK, *wĕn'lŏk*, or MUCH WEN'LOCK, *mŭch:* municipal borough in the county of Salop, England; 12 m. s.e. of Shrewsbury, about 163 m. n.w. of London. The principal buildings are the church, of considerable antiquity, bearing traces of Saxon and Norman architecture; and the town-hall, a venerable and interesting structure, decorated internally with elaborate oak carvings of the time of Charles II. There are also a savings bank and a public library and reading-room. The extensive ruins of Wenlock Abbey afford a rich treat to antiquaries. The abbey was founded by St. Milberg, granddaughter of Penda, about 680, and was the parent church of Paisley Abbey, Scotland: it was destroyed by the Danes, and refounded by Leofric 1017. The town of Wenlock proper, or Much Wenlock, is small (9,737 acres); but the municipal borough comprises 17 parishes (about 33,000 acres), including the market-towns of Madeley, Broseley, and Ironbridge, and the populous district of Coalbrookdale, where important iron and brick and tile works are carried on. There are extensive limestone quarries in the neighborhood. A railway connects Wenlock with the Severn Valley railway at Buildwas; and another connects with the Shrewsbury and Hereford line. Pop. municipal borough (1901) 15,866.

WEN'LOCK GROUP: series of rocks of Upper Silurian age, which are largely developed in the neighborhood of Wenlock, England. The group is divided into an Upper and Lower series. The Upper, the Wenlock limestone, consists of a gray subcrystalline limestone, in some places 300 ft. thick, so hard that it has withstood the weathering which has removed the softer shales above and below it. In some places it contains huge concretionary masses of crystalline carbonate of

lime, locally named 'ball-stones'; in other places it becomes thin and flaggy. It abounds in fossils, especially corals, crinoids, mollusca, trilobites. The Lower Wenlock series consists of 1,400 ft. of Wenlock shale and 150 ft. of Woolhope limestone and grit. The Wenlock shale is generally a dark gray, almost black, argillaceous rock, often containing elliptical concretions of impure earthy limestone. The Woolhope limestone and grit consists of gray argillaceous modular limestones resting on fine shales. In Denbighshire it appears as a coarse grit, often of great thickness, and producing a very barren soil. The fossils are similar to those of the Upper series.

WEN'NISH, WEN'NY. See WEN.

WENT, v. *wĕnt:* an old imperfect and pp. of the verb *wend,* now used as the past tense of the verb *go,* though in origin *went* has no connection with *go.*

WENTLETRAP, *wĕn'tl-trăp:* gasteropodous mollusk of the genus *Scalaria,* family *Turritellidæ.* The shell is spiral, with many whorls; whorls deeply divided, and not always close together, crossed by remarkably elevated ribs; aperture round and rather small. The animal is furnished with a proboscis, and has the eyes placed on an external convexity, the foot short and oval. About 100 species of the genus *Scalaria* are known. Those which have the whorls close together are called False Wentletraps by shell-collectors; those in which they are not contiguous are known as True Wentletraps. Of the former some are found in northern seas, as *Scalaria communis* on the coasts of Britain and of continental Europe, and *S. Grœnlandica* on those of North America. *S. Grœnlandica* is abundant particularly on the banks of Newfoundland, and forms part of the food of the cod. The *true* Wentletraps all are natives of the seas of warm climates. Some are very beautiful. A species found in s.e. Asia, known as the PRECIOUS WENTLETRAP (*S. pretiosa*), was formerly in such esteem among shell-collectors that an extremely fine specimen is said to have been sold for more than $1,000, and an ordinary price was from $15 to $25: it can now be bought at a low price. It is from an inch and a half to two inches long, snow-white or pale flesh-colored, with eight separated whorls.

WENT'WORTH, BENNING: colonial governor of New Hampshire: 1696, July 24—1770, Oct. 14; b. Portsmouth, N. H.; son of Lieutenant-Governor John Wentworth (1671-1730). He graduated at Harvard 1715, and became a merchant at Portsmouth, which he represented for a number of terms in the assembly. In 1734 he was appointed a king's councilor; and from 1741, when New Hampshire became a separate province, until 1767 was its governor. He was commissioned by the crown to issue grants of unoccupied lands, which he began doing 1749

in what is now s. Vermont: thus arose the famous 'New Hampshire grants' controversy between New York and New Hampshire, the colonial governor of New York claiming this land as a part of his territory, by virtue of the grant from Charles II. to the Duke of York. Gov. Wentworth, who had become wealthy through the excessive fees that he had received for these grants, lived in a style then deemed splendid at his spacious mansion in Portsmouth. He gave to Dartmouth College a large tract of land (500 acres), on a part of which the college buildings were erected. Bennington, Vt., was named in his honor. He died at Portsmouth.

WENT'WORTH, JOHN: jurist: 1719, Mar. 30—1781, May 17: b. Dover, N. H. He was a colonel of New Hampshire militia; chairman of the revolutionary correspondence committee; president of the first New Hampshire revolutionary convention 1774; and state councilor 1776-81. From 1768-75 he was a member of the colonial legislature, and speaker 1771; judge of the court of common pleas 1773-76, and supreme-court judge 1776-81.

WENT'WORTH, JOHN: lawyer: 1745, July 17—1787, Jan. 10; b. Somersworth, N. H.; son of John Wentworth (1719-81). He graduated at Harvard 1768; studied law and was admitted to practice; was a member of the committee of safety during the revolution; a member of the colonial legislature 1776-80; delegate to the continental congress 1778-9; member of the state council 1780-84, and of the state senate 1784-87. He signed the Articles of Confederation for New Hampshire. He died at Dover.

WENT'WORTH, JOHN, LL.D.: journalist: 1815, Mar. 5—1888, Oct. 16; b. Sandwich, N. H.; grandson of John Wentworth (1745-87). He graduated at Dartmouth 1836, settled in Illinois the same year, and soon began the study of law at Chicago, attending lectures at the Harvard Law School. While studying law he edited the Chicago *Democrat;* and subsequently purchased it and made it the leading newspaper of the northwest. From 1843-51 and 1853-55 he was a member of congress, elected as a democrat; 1857 and 1860, mayor of Chicago; 1861, member of the constitutional convention of Illinois; 1861-64 and 1868-72, member of the Chicago board of education; a republican member of congress 1865-67, having been one of the founders of the party. He wrote and lectured on the early history of Chicago (of whose citizens he was for many years one of the most eminent), contributed historical subjects to periodicals, and published an elaborate history of the Wentworth family. He died at Chicago.

WENT'WORTH, Sir JOHN, LL.D.: 1737, Aug. 9, 1820, Apr. 8; b. Portsmouth, N. H.; nephew of Benning Wentworth. He graduated at Harvard 1755, and began business with his father as a merchant. In 1765 he was sent

to England to present petitions in behalf of his native province, and while there received the appointment of governor, to succeed his uncle Benning Wentworth, who had resigned 1767. He received also a commission as surveyor-general of the king's woods in North America. He entered on his duties as governor 1768, June. He was popular with the people, as he was efficient in efforts for the educational and material welfare of the province; but when the rupture between the crown and its colonies came, which he had endeavored to prevent, and he attempted to assist Gen. Gage to build his fortifications, it aroused the indignation of the revolutionary party, and Wentworth was obliged to leave the country; and he sailed for England 1775. As governor he gave Dartmouth College its charter; and he endowed it with 44,000 acres of land. He was governor of Nova Scotia 1792-1808. He was made a baron 1795. He died at Halifax, N. S.

WENT'WORTH, WILLIAM: colonist: 1615-1697, Mar. 16; b. Alford, Lincolnshire, England. In 1636, with the Rev. John Wheelwright, of whom he was a follower, he came to this country and settled in Massachusetts; 1639, Aug. 4, with Wheelwright and 33 others, he signed 'A Combination for a Government at Exeter, N. H.,' but five years later removed with him to Wells, Me., where Wheelwright had obtained a grant of land; subsequently he settled in Dover, N. H., and became a ruling elder in the church, and often preached. All the known Wentworths of this country are his descendants. He died at Dover.

WEPT, v. *wĕpt:* pp. of WEEP (q.v.).

WERDEN, *wėr'dēn*, REED: naval officer: 1818, Feb. 28—1886, July 13; b. Delaware co., Penn. He entered the United States navy as midshipman 1834; was passed midshipman 1840; commissioned lieutenant 1847; served on the sloop *Germantown* during the Mexican war, and was in the expeditions to Tampico and Tuspan. In the first year of the civil war he was on the frigate *Minnesota* and had part in the attacks on the forts of Hatteras Inlet; commanded vessels of the n. Atlantic blockading squadron 1861-2, and led the first division in the taking of Roanoke Island; became commander 1862, July 16, and commanded the *Conemaugh*, of the s. Atlantic blockading squadron 1862-3; was fleet captain of the e. Gulf squadron 1864-5; with the steamer *Powhatan* blockaded the Confederate ram *Stonewall* at Havana 1865. He was commissioned captain 1866, July 25; commodore 1871, Apr. 27; rear-admiral 1875, Feb. 4. He was commander-in-chief of the s. Pacific station 1875-6.

WERE, v. *wėr* [Icel. *vera;* Sw. *vara,* to remain, to be (see WAS)]: pt. plu. indic. and pt. subj. of the verb *be.* WERT, *wėrt*, second pers. sing. of pt. subj. *were.* AS YOU WERE, in *military drill,* return to your former position.

WEREGILD, n. *wēr'gild,* or WEREGELD, or WERGILD [Lap. *warr,* Esthon. *werre;* Fin. *weri,* blood, and AS. *gild* or *gild,* a payment of money: less probably referred to AS. *wer;* L. *vir,* a man]: ancient commutation in money, by which, according to the custom of the Anglo-Saxons, Franks, and other Teutonic peoples, homicide and other heinous crimes against the person were expiated. There was an established progressive rate of weregild for homicide, varying at different times and among different Teutonic tribes, from the weregild of the *ceorl,* or peasant, to that of the king. In the time of Tacitus the weregild for homicide among the Germans was due to the relatives of the deceased; that for other crimes, one-half to the injured party and one-half to the state. The sum paid to the relatives in case of homicide, known also as the *man-wyrth,* seems to have been regarded as the equivalent of the dead man's value. As the power of the community or king increased, the exaction of retribution for the death of its members was considered to be the duty of the state as well as of the kindred, and the principle of division was applied to homicide as well as minor crimes; each payment being a separate full equivalent for the value of the deceased—one to appease the feud, the other to make atonement to the state. This double weregild is recognized in the compensation for the death of a king by the laws of the Mercians and Northumbrians. In the days of Edward the Elder the weregild had become a much more complicated penalty, the composition for homicide consisting of four different payments, two of which—the *fight-wite,* or penalty for a breach of the peace, and the *weregild*—went to the king as head of the state; while a sum called the *halsfang* was paid to the kindred to loosen the hand of the avenger of blood, and the *manbote* was given to the overlord to compensate him for the loss of a vassal. The graduated scales of weregild in use among different Teutonic nations throw much light on the gradations of society at the period. It does not appear that, among the nations who recognized the principle of weregild, the relatives were bound to accept a compensation for their kinsman's slaughter, in place of appeasing the death-feud by blood; the latter practice was often resorted to instead. A similar principle to that of weregild for homicide seems to have been recognized by the Celtic nations, and there are traces of it in the Mosaic code.

WERFF, ADRIAAN VAN DER: Dutch painter: b. Kralingen, near Rotterdam, 1659, Jan. 21; d. Rotterdam 1722, Nov. 12. He became a pupil of Van der Neer, settled in Rotterdam, and in 1696 attracted the notice of the Elector Palatine, who was thenceforward his liberal patron, and who ennobled him in 1703. Among his celebrated paintings are the *Judgment of Solomon; Christ Carried to the Sepulchre; Ecce Homo; Abraham With Sarah and Hagar;* and *Magdalen in the Wilderness.*

WEREWOLF, n. *wēr'wûlf*, or WER'WOLF, *wēr'* [AS. *wer;* Goth. *vair;* L. *vir*, a man, and *wolf*]: literally, 'man-wolf;' a man who (as is supposed), either periodically or for a time, is transformed or transforms himself into a wolf, becoming possessed of all the powers and appetites of a wolf in addition to his own, and being especially remarkable for his appetite for human flesh. (This definition includes only the commonest and best-marked incidents embraced in this belief.) The belief in the transformation of men into wolves or other beasts of prey has been very widely diffused; there are perhaps scarcely any ancient peoples among whom some trace of its former prevalence does not exist. It is not yet extinct, even in Europe. In many rural districts of France the *loup-garou* (the latter part of the word is a corruption of the Teutonic *werwolf*) is still an object of dread. This superstition lingers among the country-people of n. Europe, and a particular form of it flourishes among the Bulgarians, Slavonians, and Serbs, and even among the more intelligent inhabitants of Greece. Its details vary in different countries and districts. Manifestations suggestive of it may be occasionally observed in the mad houses of most countries: see LYCANTHROPY. The animal whose shape is taken is not always, though usually, a wolf; it was probably always the animal most frequently formidable, or considered most inimical to man. In Abyssinia it is the hyena.

Occasional notices of lycanthropy, as it is called, are found in classical writers: as there described, it was the change of a man or woman into a wolf, so as to enable the man or woman to gratify an appetite for human flesh, either by magical means, or through the judgment of the gods, as a punishment for some dire offense. Sometimes the transformation was into the shape of a dog or a bull. Ovid, in his *Metamorphoses*, tells the story of Lycaon, King of Arcadia, who, when entertaining Jupiter at a banquet, resolved to test his omniscience by serving up to him a hash of human flesh. The god, to punish him for this, transformed him into a wolf. Herodotus describes the Neuri as sorcerers who had the power of taking once a year, for several days, the shape of wolves; and the same account of them is given by Pomponius Mela. Pliny relates that, in Arcadia, every year, at the festival of Jupiter Lycæus, one of the family of Antæus was chosen by lot, and conducted to the brink of the Arcadian Lake, into which, after having hung his garments on a tree, he plunged, and was transformed into a wolf. Nine years afterward, if alive, he returned to his friends, looking nine years older than when he disappeared. Some notices of lycanthropy are found in Petronius; and allusion to it is made also by Virgil in the 8th *Eclogue*. Marcellus Sidetes tells of men who, every winter, were seized with the notion that they were dogs or wolves, and lived precisely like these animals, spending the night in lone cemeteries. This disorder attacked men chiefly in the beginning of the year, and was at its height usually in February. The classical instances of lycan-

thropy refer mostly to Arcadia, a pastoral country, whose inhabitants suffered greatly from ravages by wolves.

In Norway and Iceland it was believed that there were men who were 'not of one skin:' such men could take other shapes than that of man, and the natures corresponding to the shapes which they assumed; they had the strength and other powers of the animal whose shape they bore, added to their own. It was believed that the change of shape might be effected in one of three ways: simply by putting on a skin of the animal; by the soul of the man deserting the human body—leaving it for a time in a cataleptic state—and entering into a body borrowed or created for the purpose; or, without any actual change of form, by means of a charm, which made all beholders see the man under the shape of the animal whose part he was sustaining. The two former were the common modes of transformation; at any rate, the sagas are full of illustrations of them, while illustrations of the third mode are comparatively rare. Nothing of the man remained unchanged except his eyes; by these only could he be recognized. Odin had, and freely exercised, the power of varying his shape. When men changed their shape to prey upon their kind, they always took the form of a wolf. It was believed that many had the power of thus transforming themselves; and great was the popular dread of werewolves. Perhaps the best stories of werewolves are in the northern sagas. Scarcely anywhere did the belief in them go so deep into the minds of the people as among the northern races. In connection, notice may be taken of the 'Berserkr rage,' which appears to have been a peculiar form of mania. The Berserkr yelped like dogs or wolves rushing into conflict, bit their shields with their teeth, and committed terrible atrocities while the paroxysms of their disease were upon them. Berserkr has been rendered 'bare-skinned;' others make it mean 'wolf-skin-coated' (why not 'bear-skin-coated?').

Olaus Magnus states that in Prussia, Lithuania, and Livonia, though wolves were very numerous and troublesome, the ravages of the werewolves were regarded as much more serious. Every year (as was believed) at the feast of the Nativity, at night, the werewolves assembled in great numbers at appointed places, and proceeded to look out for human beings, or tame animals, on which they could glut their appetites. If they found an isolated house, they entered it and devoured every human being and tame animal that it contained; after which—showing that they were not common wolves—they drank up all the beer or mead. Similar testimony with regard to Livonia is given by Bp. Majolus, who adds that the transformation into the wolf form continued for 12 days.

Instances of persons changed into wolves by way of punishment were freely believed in the middle ages—e.g., St. Patrick was believed to have changed Vereticus, King of Wales, into a wolf; and there was an illustrious Irish family which had incurred the curse of St. Natalis, every member of which, male and female, according to the popu-

lar belief, had to take the shape of a wolf, and live the life of a wolf for seven years.

In the 15th and 16th c. the belief in werewolves was, throughout the continent of Europe, as general as the belief in witches, which it had then come to resemble in many respects. It gave rise to prosecutions almost as frequent as those for Witchcraft (q.v.); and these usually ended in the confession of the accused, and his death by hanging and burning. It was of a nature to inspire even greater terror than witchcraft, since it was believed that the werewolves delighted in human flesh, and were constantly lying in wait for solitary travellers, and carrying off and eating little children. The werewolves, like the witches, were now regarded as servants of the devil, from whom they got the power—often exercised by anointing with a salve—of assuming the wolf's form; and it was believed that great numbers of them trooped together to the devil's Sabbath. The stories of mutilations and other mishaps befalling them in the wolf-state, by which, when they resumed the human form, they were identified as werewolves, exactly resemble the stories told of witches. In 1573, Sep., a court of parliament sitting at Dôle, in Franche-Comté, authorized the country-people to take their weapons and beat the woods for a werewolf, who had already —thus went the recital—'carried off several little children, so that they had not since been heard of, and done injury to some horsemen, who kept him off only with great difficulty and danger to their persons.' Throughout Europe the judicial cognizance of witchcraft and of lycanthropy ceased at the same time. In Great Britain, where wolves had early been exterminated, the werewolf was known only by rumors coming from abroad; but the belief that witches could transform themselves into cats and hares, which was prevalent, was precisely analogous to the later forms of the belief in werewolves.

The later forms of this strange belief were obviously sophisticated. In its earlier shape, three things are to be noticed—the power ascribed to the werewolf of transforming himself, either by changing the shape of his own body, or projecting his spirit into another body; his appetite for human flesh; his taking the shape and nature of the animal held to be most malicious against man—the wolf. As to the first of these, all that can here be done is to point to its connection with the doctrine of Transmigration (q.v.) and to add that it has been one of the commonest of human beliefs. As to the second, is it unlikely that, in the early times in which the superstition had its origin, the appetite for human flesh may have been frequent enough to spread terror through whole districts? Modern Europe affords unquestionable instances of this taste existing and being indulged in the midst of comparative civilization. There can be no doubt that some of the unhappy multitude put to death as werewolves had really murdered and eaten the flesh of human beings. But secret murders, unaccompanied by cannibalism, would tend to support a popular belief in cannibalism. We have not to go out of our own age

for proofs of the existence of men afflicted with a homicidal tendency; and in times when the means of detecting crimes were very imperfect, it is conceivable that the murders committed by one or two such persons would spread terror and give support to a superstitious theory throughout a large district. Maréchal de Retz, who lived in the middle of the 15th century, had caused to be stolen and put to death by torture many hundred children—he confessed on his trial that he had murdered 120 in a single year. (A memoir of Gilles de Laval, Maréchal de Retz, has been compiled from authentic documents by P. J. Lacroix, eminent French antiquary.) Perhaps no great community has been free from men similarly constituted, and acting similarly according to their opportunities. As to the third point, the taking of the wolf-shape, if it be granted that some practice of or general suspicion of cannibalism existed among a people who believed in the power of transformation, it is easy to understand how the cannibal, getting his victims by stealth, was supposed to indulge his inhuman appetite under the guise of the animal most unfriendly to man. And the existence of a form of mania in which the madman had the hallucination that he was changed into a wolf, yelled like a wolf, lived in many respects like a wolf, tended to confirm the belief in men-wolves: in conjunction with the mischief done by real wolves, this itself may be thought almost enough to have given origin to the superstition. See *The Book of Were-wolves,* by Sabine Baring-Gould (Lond. 1865).

WERNER, Abraham Gottlob: German mineralogist: b. near Bunzlau 1750, Sept. 25; d. Dresden 1817, June 30. In 1775 he was appointed inspector and teacher in mineralogy and mining in the Mining Academy at Freiberg, in which position he remained for the rest of his life. He was the first to separate geology from mineralogy, and to place the former on the basis of observation and experience. The geological theory with which his name is connected is that which attributes the phenomena exhibited by the crust of the earth to the action of water, and is known as the Wernerian or Neptunian theory, in contradistinction to the Huttonian or Plutonic. He was nominated counsellor of the mines of Saxony in 1792, and had a great share in the direction of the Academy of Mining, and in the administration of public works. He published *Kurze Klassification und Beschreibung der Gebirgsarten* (1787); *Neue Theorie über die Entstehung der Gänge* (1771).

WERNER, Friedrich Ludwig Zacharias: German dramatist: b. Königsberg 1768, Nov. 18; d. Vienna 1823, Jan. 23. After attending Kant's lectures in his native town, he became in 1793 chamber secretary in the Prussian service, and in 1805 obtained a government post in Berlin, but two years later he retired from the public service. In 1811 he joined the Roman Catholic Church,

and in 1814 was consecrated priest at Aschaffenburg. Taking up his residence in Vienna, he became known as an eloquent preacher and later was appointed head of the chapter of the cathedral of Kaminiec. Werner's dramatic works reveal much of the power and pathos characteristic of Schiller, but overlaid to a constantly increasing extent, as he advanced in years, by mystical and undramatic elements. The chief of them are: *Die Söhne des Thals* (1804); *Das Kreuz an der Ostsee* (1806); *Martin Luther oder die Weihe der Kraft* (1807); *Attila* (1808); *Wanda* (1810); *Die Weihe der Unkraft* (1813); a sort of retraction of the earlier play on Luther; *Kunigunde die Heilige* (1815); *Der 24. Februar* (1815); *Die Mutter der Makkabäer* (1820).

WER'NERITE: an important rock-forming mineral, occurring in cleavable-granular, indistinctly-fibrous or columnar masses, or often in large, coarse crystals. These are tetragonal prisms terminated by pyramids, and show good prismatic cleavage. The hardness is 5 to 6 and specific gravity about 2.7. The most common colors are white or gray; lilac is also quite abundant; occasionally greenish and brick-red varieties are found. Wernerite is a member of the scapolite group and is intermediate in composition between meionite and marialite, being a silicate of aluminum, calcium and sodium, with chlorine. It usually occurs in crystalline limestone. Among its many localities a few of the most important are Arendal, Norway; Bolton, Massachusetts; northern New York, Ontario and Quebec. The mineral was named (in 1800) in honor of the distinguished mineralogist, A. G. Werner.

WERNIGERODE, *vĕr-nē-gā-rō'dĕh:* small walled town of Magdeburg, in Prussian Saxony; 43 m. s.w. of the city of Magdeburg; at the n. base of the Brocken Mountain. Its castle, residence of the Counts Stolzberg-Wernigerode, contains a library of 40,000 volumes, and has a zoological garden. Wernigerode manufactures linen, cloth, and tobacco; and carries on copper-smelting and paper-making. Pop. 10,000.

WERSH, a. *wĕrsh,* or WARSCH, *wärsh* [origin uncertain]: in *Scot.,* not sufficiently salted; insipid; tasteless; poor in flavor or quality; of a pale or sickly appearance. WERSH'NESS. n. the quality of being wersh. WERSH'LY, ad.

WE'SAND: variant of WEASAND.

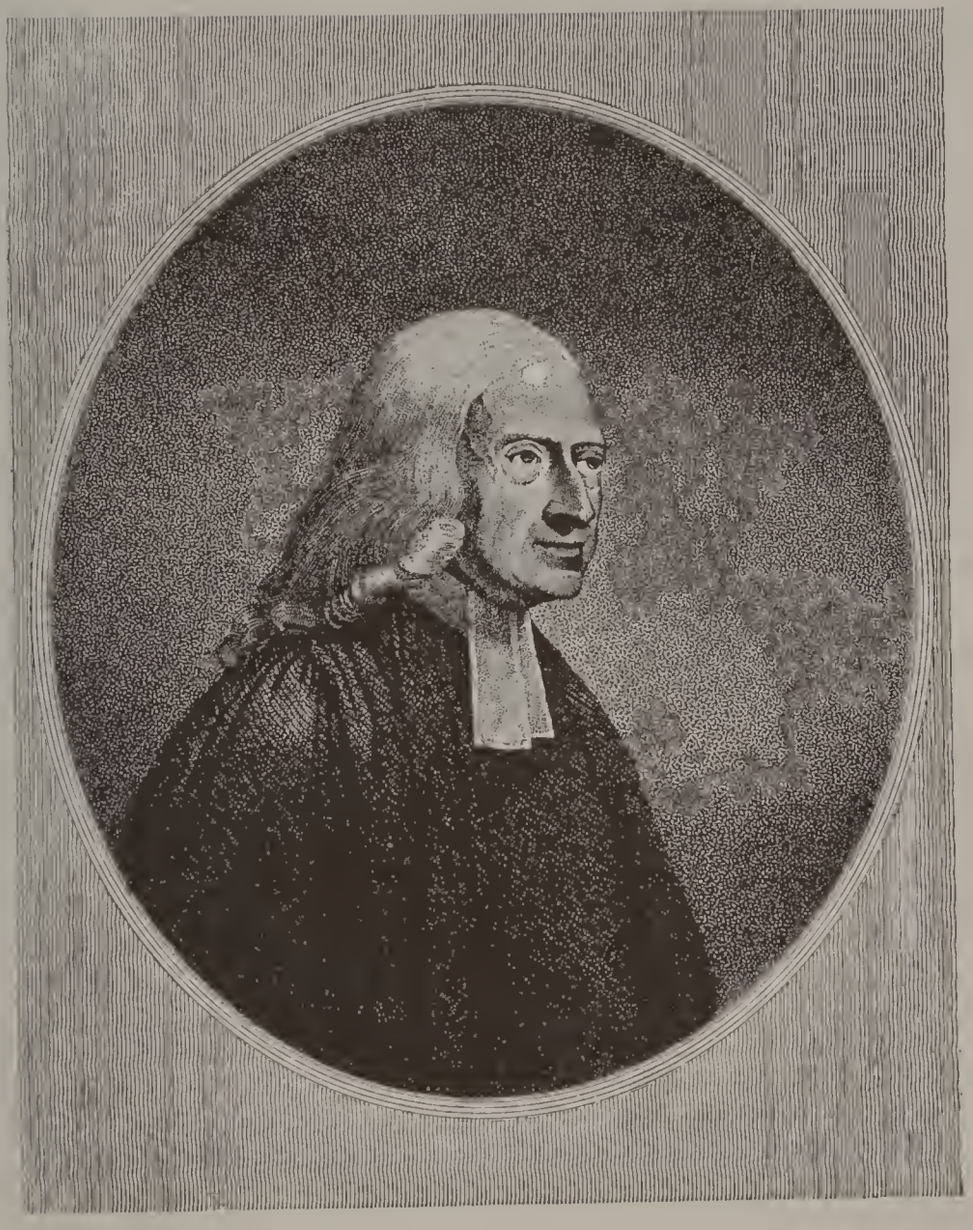
WESEL, *vā'zĕl:* strongly fortified town of Westphalia, Prussia; on the Rhine; 32 m. n.n.w. of Düsseldorf. The Rhine, here joined by the Lippe, is divided by a fortified island, and crossed by a bridge of boats, protected on the left bank by a fort. Of its churches, the Willibrod Kirche was opened 1181, though in its present form dating from 1521. Cloth, hosiery, serge, leather, hats, tobacco, and linen are manufactured, and book-printing is

carried on. The citadel is defended by about 4,500 men. Pop.—more than half Roman Catholics—22,547.

WESER (Latin *Visurgis*): a river of Germany, formed by the junction of the Fulda and Werra at Münden, between the provinces of Hanover and Hesse-Nassau. It flows tortuously first northwest, then north-northeast between Westphalia and Brunswick and after a circuitous northwestern course, traverses the town and the territory of Bremen, forms the boundary between Hanover and Oldenburg, at Elsfleth turns almost due north, and falls by a wide mouth, encumbered with sandbanks, into the German Ocean. Its whole course is about 430 m. It is navigable by barges to some distance up both headstreams, but the practical limit of summer navigation is Hameln. The lower part, from Bremen to Bremerhaven, has been deepened and improved for large vessels.

WESLEY, *wĕs'lĭ*, Eng. *wĕz'lĭ*, CHARLES: 1708, Dec. 18 —1788, Mar. 29; b. Epworth, Lincolnshire, England; younger brother of John Wesley. He was associated with his brother in the whole Methodist movement. Having studied at Christ Church, Oxford, and having been ordained priest, he visited Georgia with his brother; and was active in the subsequent work in England, seconding his brother with unceasing diligence, and by his hymns contributing greatly to the success of the movement. He was a clear and simple preacher and a man of fervent piety, but of a disposition far removed from asceticism, and without his brother's oratorical gifts and personal force. He wrote more than 6,000 hymns, of which 4,100 were published: they are largely in use among the Methodists; and many, in use among various denominations, are among the best and most admired hymns in the English language, replete with pious feeling, and of lyrical power and sweetness almost unsurpassed. See his *Sermons* with Memoir (1816); *Life*, by the Rev. Thomas Jackson (1841); and *Journal*, with notes (1849).

WES'LEY, JOHN: founder of the Methodists (see METHODISTS—British; METHODIST EPISCOPAL CHURCH; Etc.): 1703, June 17 (o.s.)—1791, Mar. 2; b. Epworth, Lincolnshire, England; second son of Samuel Wesley (1662-1735).—The family name, variously spelled Wesley and Westley, is supposed to be the same with Wellesley, and to be derived from Welswe, near Wells, in Somerset. An Irish gentleman, Garrett Wellesly, of Dungannon, offered to make Charles Wesley, younger brother of John, his heir, on condition of his settling in Ireland—believing him to be of his own family. The offer was not accepted; and the estate of Garrett Wellesley went to another branch of the family, which was soon raised to the Irish peerage, with the title Earl of Mornington, and from which the Duke of Wellington and the Marquis of Wellesley sprang. The immediate progenitors of John



JOHN WESLEY.

Wesley were ministers of the Church of England, of Puritan principles. Some of them suffered for nonconformity. Bartholomew Wesley, great-grandfather of John, was ejected from his living by the Act of Uniformity 1662. John Wesley, son of Bartholomew, also was deprived of his living; and was often fined, and several times imprisoned, for preaching contrary to the law. His son Samuel Wesley (1662-1735) conformed to the Church of England—giving great offense to his family; but opposed the schemes of James II., refusing to be bribed by offers of preferment. He supported the cause of the Revolution, in circumstances of personal danger, and in the beginning of the reign of William and Mary was rewarded with the living of Epworth. He wrote an epic poem, *The Life of Christ,* and similar works. He had 19 children. His wife, Susannah Annesley, daughter of an ejected clergyman, was a woman of remarkable intelligence, great force of character, and fervent piety, who devoted herself to the education, particularly the religious education, of her children. His eldest son, Samuel Wesley (1690-1739) head-master of Tiverton School in Devonshire, was a tory and high-churchman, who strongly disapproved of the 'new faith' and peculiar course of his brothers John and Charles.—John Wesley, founder of Methodism, second son, or the second who grew to manhood, had, as a child of 6, a narrow escape from being burned to death, when the parsonage of Epworth was burned by some of the parishioners, enraged at their pastor's faithful reproving of their vices. Another remarkable story is connected with the parsonage of Epworth and with John Wesley's early years—the continued disturbance of the family, for a considerable time, by loud knockings and other noises, which could not be accounted for, and which therefore were regarded as preternatural; though the annoyed household persisted in residing in the parsonage, even making sport of 'Old Jeffery,' their unseen visitant, who, on the theory of some writers, 'was plainly a Jacobite goblin, and seldom suffered Mr. Wesley to pray for the king and the Prince of Wales without disturbing the family prayers.' Adam Clarke, however, and other investigators invited by the family, declared the occurrences quite unaccountable.

John Wesley was a very diligent and successful student. The religious history of his college life belongs to the history of Methodism. After much conscientious hesitation as to his motives and fitness for entering into the clerical profession, he was ordained in the Church of England as deacon 1725; and in 1726 he graduated M.A., and was elected fellow of Lincoln College, Oxford. In the same year he was appointed Greek lecturer and moderator of the classes. He became curate to his father at Wroote, a small living which Samuel Wesley held with that of Epworth; and while serving here he was ad-

vanced to priest's orders 1728. He returned to Oxford, and with his younger brother, Charles Wesley, entered into those religious associations from which Methodism sprang. The intercourse of the brothers Wesley at this time with William Law, author of the *Serious Call*, had great influence on their opinions and conduct. They walked two or three times a year from Oxford to visit Law at his house near London. In 1735 John Wesley was induced to go to Georgia with Gen. Oglethorpe, to preach to the Indians and colonists. His religious views at this time were strongly tinctured with asceticism. His intercourse with some Moravians, his fellow-passengers to America, afterward his fellow-laborers in the colony, tended to stimulate his religious zeal. He attempted to establish a discipline in the colony, very different from that of the Church of England at home; and failed in the attempt. The difficulties of his position were increased by an affair in which he became involved with the daughter of the chief magistrate of Savannah, whom he wished to marry; but on the advice of the Moravian bishop and elders, to whom he submitted the matter, he withdrew from her. She very soon married another, and Wesley refused her admission to the communion; on which her husband raised an action at law, and Wesley, finding Savannah no suitable place for him, and, as he said, 'shaking the dust off his feet,' returned to England, having resided in America not quite two years. With religious zeal undiminished, he maintained intimate connection with the Moravians in London. Several months after his return to England, he attended (1738, May 24) a meeting of a society in Aldersgate street, where, while one was reading Luther's preface to the Epistle to the Romans, he experienced such a change of religious feeling that, notwithstanding all his previous zeal, he ever afterward regarded this as the time of his conversion. 'I felt my heart strangely warmed,' he says; 'I felt I did trust in Christ, Christ alone, for salvation; and an assurance was given me that He had taken away *my* sins, even *mine*, and saved me from the law of sin and death.' Many who accept generally Wesley's views of conversion doubt his opinion as to the date of his own. After this he visited the Moravian brethren at Herrnhut, in Germany, made the acquaintance of Count Zinzendorf, and was introduced to the prince royal of Prussia, afterward Frederick the Great. Returning to England, he became associated with his old college companion George Whitefield (q.v.); and after his example began, 1739, the practice of open-air preaching. From this time the history of Wesley's life becomes very much the history of Methodism. In 1740 he solemnly separated himself from the Moravians, finding that he differed from them on important points of doctrine; and in the same year the doctrinal breach took place between Whitefield and him, which divided the Methodists into

two sections, Calvinistic and Arminian. In the evangelistic work which he carried on in England, and in organizing the Methodist body, Wesley was indefatigable. He seldom travelled less than 40 miles a day, usually on horseback, till near the close of his life, when he used a chaise. In 1752 he married a widow with four children, but the marriage proved unhappy, and a separation ensued. His health gradually declined during the last three years of his life, and after a short illness he died in London, in the 88th year of his age. His remains lay in state for several days in his chapel in the City Road, dressed in the sacerdotal robes which he usually wore, with a Bible in his hand.—Wesley was a voluminous writer. His writings are chiefly polemical and religious. His style in the pulpit was fluent, clear, and argumentative, not impassioned like Whitefield's; his countenance was mild and grave; and his manners agreeable, though he exercised imperial domination over the preachers of the Methodist body. He was a man of great benevolence, and gave away all his living to the poor. Probably no man ever exerted so great an influence on the religious condition of the people of England as John Wesley, and his influence, constantly increasing, has extended to the most remote parts of the world. See *The Works of the Rev. John Wesley* (16 vols. Lond. 1809); *Life of the Rev. John Wesley, A.M.*, by Dr. Coke and Mr. Moore (Lond. 1792); *The Life of Wesley,* by Southey (2 vols. 1820; new ed. 1864); *The Life and Times of Wesley,* by Tyerman (1870); *John Wesley and the Evangelical Reaction,* by Miss Wedgwood (1870); *John Wesley,* by J. H. Overton (1891); and *The Life of John Wesley,* by C. T. Winchester (1906).

WESLEY, Samuel: English clergyman and poet: b. Winterborne-Whitchurch, Dorsetshire, 1662, Dec. 17; d. Epworth, Lincolnshire, 1735, Apr. 25. He was the father of Charles, John, and Samuel Wesley, Jr. Graduated from Exeter College, Oxford, in 1688, he was ordained priest in 1690, became rector of South Ormsby, Lincolnshire, in that year, and in 1695 of Epworth in the same county. He wrote *Life of Christ: An Heroic Poem* (1693); *Eupolis's Hymn to the Creator* (1778); and other works, including the posthumous *Dissertationes in Librum Jobi* (1735); etc. He is best known by the two hymns to be found in Methodist hymn books, *Behold the Saviour of Mankind,* and *O, Thou, Who, When I Did Complain.*

WESLEY, Samuel: English hymn-writer, son of the preceding: b. Spitalfields, London, 1691, Feb. 10; d. Tiverton 1739, Nov. 6. He was head-master of Bundell's grammar school in Tiverton, in 1732-39. He did not embrace Methodism with his brothers, and wrote of it as 'a spreading delusion.' He was graduated from Christ Church, Oxford, in 1715, and took orders. He is best known by his hymns in the Methodist hymn book. Among

the titles of individual volumes by him were: *Poems on Several Occasions* (1736), reprinted in 1808 and 1862; and *The Christian Poet* (1735).

WESLEYAN, a. *wĕs'lĭ-an:* of or pertaining to the Wesleys, but specifically John Wesley, or the sect founded by him: N. one of the sect called Methodists, established by John Wesley about 1739. WES'LEYANISM, n. *-ĭzm*, doctrines and church government of the Wesleyan Methodists.

WESLEYAN FEMALE COLLEGE: educational institution of the Methodist Episcopal Church South, at Macon, Ga. It was incorporated by the legislature, 1836, Dec. 23, as the Georgia Female College, and began its work 1839, Jan. 7, under trustees substantially the same as those of Emory College at Oxford, Ga. Its buildings cost $85,000. Its first class of 11 received A.B. diplomas in 1840—a fact which places it among the earliest institutions giving college degrees to women. Financial difficulties soon befell it; and its land and buildings, bought for a small sum at sheriff's sale, 1843, Dec. 19, were given to the Georgia annual conference of the Methodist Episcopal Church South, which continued it in operation under the same faculty and trustees—changing its name to that which it now bears. The main building, enlarged and beautified in 1881 by the gift of $65,000 from George I. Seney, of Brooklyn, N. Y., is now one of the best in the south for educational purposes. Mr. Seney's total gifts to the college amounted to $125,000. The curriculum comprises the usual collegiate studies. Much attention is given to music; and in art the various applications of drawing and painting are taught. Besides the regular A.B. course, there is a preparatory department and a post-graduate or A.M. course of two years. Number of instructors 17; students 325; value of property $280,000; volumes in library 5,000.

WESLEYAN METHODIST CONNECTION OF AMERICA, known commonly as the Wesleyan Methodist Church: religious body organized at Utica, N. Y., 1843, by ministers and laymen, mostly of the Methodist Episcopal Church. Its origin was in the anti-slavery agitation of four or five previous years. The body adopted the articles of faith of the Methodist Episcopal Church substantially; discarded episcopacy and presiding eldership from the plan of government, substituting a stationing committee whose appointments are subject to approval by the conference, and permitting societies and churches to negotiate with any desired pastor, referring their choice and its acceptance to the stationing committee; and constituted the general and annual conferences of both ministers and lay delegates, with a representation also of local preachers. The rules of discipline adopted were stringent not only in respect to slave-holding, but also in forbidding the manufacturing, buying, selling, or using of intoxicating liquors, except for mechanical,

chemical, or medicinal purposes, or in any way knowingly aiding others so to do; also in refusing to tolerate any ministers or members holding connection or fellowship with secret, oath-bound societies. Accordingly on more than one occasion, as in 1883, a delegate from the Meth. Episc. Church has been denied recognition on the ground that he was a member of a secret order.—The denomination was organized with 300 ministers and preachers, mostly local, and a membership of about 6,000. At the general conference of 1883 the assets of the publishing house at Syracuse, N. Y., including building, were $49,975; two additional conferences were instituted; and it was resolved that the denomination was committed to the doctrine and work of holiness, in both justification and regeneration, and, subsequently to these, in entire sanctification. A resolution forbidding use of instrumental music in public worship failed of adoption; and one was passed forbidding division of any conference on account of color or nationality, in any case where all the pastors speak the same language. In 1887 resolutions were adopted against extravagance and vanity, especially in dress and furniture; and a vote in favor of the ordination of women was a tie, and lost.—The denomination seems to have been steadily growing. In 1881 there were 250 itinerant ministers and 200 local preachers, increased respectively in 1885 to 267 and 215. Membership reported 1908 was 19,064, with 524 ministers, and 598 churches. The African mission has resulted in two mission-posts—one in the interior; the other at Freetown, Sierra Leone, where there is a church and school building, together valued at $30,000. The assets of the publishing house at Syracuse, N. Y., are valued at $75,000, and the business is increasing. The organs of the denomination are the *Wesleyan Methodist* and the *Gospel Record*. There are two seminaries—one at Houghton, Allegany co., N. Y., which has a theological, or Bible training department; and the other at Wasioja, Dodge co., Minn.

WESLEYAN UNIVERSITY: educational institution at Middletown, Conn., under the auspices of the Methodist Episcopal Church. It is the oldest now in the care of that denomination, and originated in the gift of two buildings erected for a military academy 1825, the gift conditioned on raising $40,000. The college was opened in the year of its charter, 1831, under the presidency of Wilbur Fisk, D.D., who continued until 1839. The students at first were classified and graduated according to attainments, without reference to the number of years passed in study. Now there are three courses of four years each—the classical, the Latin scientific, and the scientific. Since 1872 young women have been admitted to the classes, but the number has been comparatively small, the last report giving 57. Candidates can be admitted on certificate from certain high-grade preparatory

schools. There are two grades of honors—the first requiring 88 per cent. proficiency, the second 83 per cent.; and the usual degrees in arts, philos., and science are conferred. In 1863 a gymnasium was built, but was replaced by one costing $60,000, of which amount five-sixths was taken from Fayerweather bequest of $150,000. In 1868 a library building was given by Isaac Rich, of Boston; it contains 61,000 vols., and has a fund yielding $1,100 annually. In 1871 the memorial chapel, provided for by the alumni and other friends, was erected in honor of students who fell in the civil war. The same year Orange Judd erected the hall bearing his name, devoted to natural science, including biological and chemical laboratories, and museums which are especially rich in mineralogical and geological treasures (15,850 specimens) and large collections of shells (96,000), fishes (2,100), and other classes, with a herbarium of 10,700 species, in part the results of scientific expeditions from the university. Observatory Hall contains laboratories for physics and a Clark equatorial telescope of 12 in. aperture, with other instruments. The university was one of the first to provide scientific courses. In 1891 it instituted a well-provided department of electricity; and it is the seat of the Storrs Agricultural Experiment Station, one of whose officers is the state chemist. In 1903, the Wilbur Fish Recitation Hall and the Scott Laboratory of Physics were opened. Tuition is practically free by reason of scholarships, of which 48 were established by George I. Seney. Daniel Ayres. of Brooklyn, N Y. (d. 1892, Jan.), was one of the largest benefactors, giving $150,000 in 1890 for the biological department. The alumni elect 5 trustees; Meth. Episc. conferences in New England, N. Y., N. J., and Pa., 13; the rest are elected by the board. In 1909 it was voted to abandon the co-educational feature, and establish a separate college for women, after the style of Radcliffe at Harvard.

WESSEL, *vĕs'sĕl*, JOHANN (WESSELUS, *vĕs-sā'lŭs*, GANSFORTIUS); called also *Gansfort:* one of the precursors of Luther and the Reformation; b. Gröningen, 1400 (or, according to some authorities, 1419 or 21); d. 1489, Oct. 4. He was probably the most renowned scholar of his day. He taught philosophy at Cologne, Louvain, Heidelberg, and Paris, and died in his native town. On account of his vast learning, he was called *Lux Mundi* (Light of the World); while his enemies, on account of his opposition to the scholastic philosophy, termed him *Magister Contradictionum* (Master of Contradictions). His theology was developed from his deeply devotional mysticism. His tendencies toward a spiritual faith led him to take ground strongly anti-ecclesiastical: his dying utterance was, 'I know only Jesus the crucified.' He denied the infallibility of the pope, the authority of ecclesiastical tradition, and all magical efficacy in the sacraments. Luther highly esteemed Wes-

sel's writings; yet it cannot be shown, as has been asserted, that he forestalled Luther in his doctrine of justification by faith. After his death a large portion of his writings were burned as heretical. Another portion appeared under the title *Farrago Rerum Theologicarum*, of which Luther published an ed. with preface (Wittenb. 1522); but the most complete ed. is that by Joh. Lydius (Amst. 1617).

WESSELLS, *wĕs'sĕlz*, HENRY WALTON: soldier: 1809, Feb. 20—1889, Jan. 14; b. Litchfield, Conn. On graduating at West Point, 1833, he was assigned as 2d lieut. to the 2d U. S. infantry regt.; served in the Seminole war 1837-40, and in the meantime reached the grade of 1st lieut.; served in the Mexican war, was promoted capt. 1847; was brevetted maj. for gallant conduct at Churubusco, and received from the state of Conn. a sword of honor for 'distinguished services at Vera Cruz, Cerro Gordo, Contreras, and Churubusco.' He served with his regt. on the Pacific coast 1849-54, and on the n.w. frontier 1855-61, taking part in the Sioux expedition 1855; was commissioned maj. 1861, and was for a time col. of a Kansas regt. Transferred to a command in the Army of the Potomac, he served through the Peninsular campaign and was wounded at Fair Oaks. Afterward he was engaged in the operations in North Carolina. After a gallant resistance of 4 days, at Plymouth, N. C., he with his garrison of 1,600 men surrendered to Gen. Robert F. Hoke, who had invested the place with an army of 7,000 men. Wessells was held prisoner by the Confederates, and was one of the Federal officers exposed on Morris Island, Charleston Harbor, to the fire of the Federal batteries.

WESSON, *wĕs'sŏn:* town, Copiah co., s.w. Miss.; on Ill. Central railroad. Wesson has several banks, telegraph and telephone communications, and express service. The chief industry is the manufacture of cotton and woolen goods; the local factory employs nearly 2,000 persons. Agricultural pursuits are followed and a weekly newspaper is published. Wesson is popular as a summer resort.—Pop. 3,000.

WESSEX, England: a former kingdom, from the 6th to the 9th century, one of the most important of the Saxon heptarchy, and that in which the other kingdoms were ultimately merged in the reign of Egbert in 827. Wessex, signifying West Saxons, as an independent unit of the heptarchy, occupied a territory now comprised in Dorset, Wilts, and parts of Somerset and Hants.

WEST, n. *wĕst* [Dut. *west*, west: Dan. and Sw. *vest;* Icel. *vestr*, the west: AS. and Ger. *west*, west]: strictly, the quarter of the heavens where the sun sets at the equinox; one of the four chief points of the compass; a country or district lying in the direction of the setting sun: V. in *OE.*, to pass or change to the west; to set, as

the sun: ADJ. situated toward or coming from the part where the sun sets: AD. to the western regions; more westward. WEST'ERING, a. in *OE.*, passing to the west. WEST'ERLY, a. *-ėr-lĭ*, lying or being toward the setting sun; coming from the west or a point near it: AD. tending or passing toward the west. WEST'ERN, a. *-ėrn*, of or pertaining to the west; lying or looking toward the west; dwelling in the direction toward the west; going to the west; coming from the west. WEST'ERNER, n. *-ėr*, one who lives in a western country or district. WEST'ING, n. the distance, expressed in nautical miles, which a ship makes good in a west direction; departure westward. WEST'ERNMOST, or WEST'MOST, a. *-mōst*, farthest to the west. WEST'WARD, ad. *-wėrd*, toward the west; in a direction toward the west; also WEST'WARDLY, ad. *-lĭ*, and WEST'WARDS, ad. *-wėrdz*.

WEST, BENJAMIN: American painter: b. Springfield, Chester co., Pa., 1738, Oct. 10; d. London 1820, Mar. 11. After some instruction from William Williams, a Philadelphia painter, and having painted *The Death of Socrates* for a gunsmith, he established himself as a portrait painter at Philadelphia at five guineas per portrait, and subsequently followed the same profession in New York. In July, 1760, he visited Rome, whence he proceeded to Florence, Bologna, Venice, and Parma. Returning to Rome, he painted *Cimon and Iphigenia* and *Angelica and Medora.* He was elected member of the Academies of Florence, Bologna, and Parma, and, visiting England in 1763, was so well patronized that he determined to make it his future residence. He executed a historical painting of *Agrippina Landing with the Ashes of Germanicus* for Drummond, archbishop of York, who introduced him to George III. The king became his steadfast patron, and gave him commissions for many years. In 1772 he was made historical painter to the king, in 1790 surveyor of the royal pictures. He was one of four selected to draw up a plan for the Royal Academy, was one of the original members, and there exhibited his *Death of General Wolfe* (now in the Grosvenor gallery, London), in 1771. In this canvas West departed from the custom of the artists of the day of giving the characters Greek or Roman costumes. Reynolds, who had endeavored to dissuade him, later said, 'I retract my objections. I foresee that this picture will not only become one of the most popular, but will occasion a revolution in art.' Woolett's plate after this work had the largest sale of any engraving of modern times. West painted a series of historical works for Windsor, and for the chapel a series on the progress of revealed religion, divided into four series, antediluvian, patriarchal, Mosaic, and prophetic. On the death of Reynolds, in 1792, he was unanimously elected president of the Royal Academy. When George III. became insane the order for painting the religious series was abruptly re-

called and the pay stopped. West had finished 28 pictures, and sketched the entire series. He afterward painted a number of religious and historical pictures on very large canvases. Among them may be noticed *Christ Healing the Sick* (in the National Gallery), the *Crucifixion*, the *Ascension*, and *Death on the Pale Horse* (Pennsylvania Academy). The *Battle of La Hogue* is among the best of his historical pieces. West's pictures numbered about 400. They are chiefly of heroic size, and display much inventive power and great skill in composition. But they are monotonously reddish-brown in coloring, and, despite their facility, lack spirit and imaginative value. His position in early American art has won for him a recognition somewhat in excess of his actual merit.

WEST, James Harcourt: American publisher and Unitarian clergyman: b. Melrose, Mass., 1856, Jan. 13. He was educated at Tufts Divinity School, was engaged in printing and as a newspaper correspondent in 1873-84, and in 1884-94 was minister in charge of various Unitarian and Congregational Societies. He founded the *New Ideal Magazine* in Boston in 1889 and has been engaged as a publisher since 1888. His writings include: *Holiday Idlesse, and Other Poems* (1880); *Uplifts of Heart and Soul* (1887); *The Complete Life* (1888); *Visions of Good—Poems of Freedom* (1892); *In Love with Love* (1894); etc.

WEST, Thomas, Baron Delawarr or Delaware: English colonial governor of Virginia: b. 1577, July 9; d. at sea off the Atlantic coast of America, 1618, June 7. He was educated at Queen's College, Oxford, in 1597 was returned to Parliament for Lymington, fought in the Low Countries and in Ireland, in 1609 became a member of the council of the Virginia Company, and in 1610 was made first governor and captain-general for life. On June 10 he arrived at Jamestown, where he soon restored order and comparative prosperity. He established a post at Riquotau (now Hampton), and built two forts. At the time of his coming want and mismanagement had almost compelled the settlement to disperse. By June, 1611, he was again in England, where he printed a very favorable report as 'The Relation of the Right Honorable the Lord De-La-Warre.' In March, 1618, he set sail once more for Virginia, but he died on the voyage.

WEST'ALL, Richard: English painter: b. 1765; d. London, 1836. He was apprenticed in London to an engraver on silver in 1779; subsequently studied at the schools of the Royal Academy and began to practice his art in association with Thomas Laurence in Soho Square. Here he became very popular as an illustrator of books and for a single design in water colors sometimes received $400 or $500. He also painted historical subjects. His *Elijah Restoring the Widow's Son to Life* was purchased

for some $2,250 by the directors of the British Institution; but his paintings in oil were not generally salable; his designs and figures are monotonously conventional, although some of his scenes from peasant life are by no means destitute of freshness and charm. One of his last occupations was that of teaching drawing to Princess, afterward Queen Victoria of England. His water color painting, *Cassandra Prophesying the Fall of Troy,* is now in the South Kensington Museum; and his pictures in oil of *Christ Crowned with Thorns* in All Souls' Church, Langham Place, London.

WESTALL, William: English novelist: b. White Ash, Lancashire, 1834, Feb. 7; d. 1903, Sept. 9. He was educated at the Liverpool High School, engaged in business and in journalism, and was foreign correspondent for the London *Times* and *Daily News,* traveling in North and South America and in the West Indies. He has been a prolific writer and among his publications are: *Tales and Traditions of Saxony and Lusatia* (1877); *In Tropic Seas* (1878); *Harry Lohengrin* (1879); and *The Old Factory* (1881); *Red Ryvington* (1882); *A Queer Race; A Phantom City.*

WEST BAY CITY, Mich.: city on the Saginaw River, and on the Grand Trunk, the Michigan C., and the Detroit & M. R.R.'s; opposite Bay City and 12 m. n. of Saginaw. It is connected with Bay City by several railroad bridges. It is in an agricultural region, and it has a number of industries connected with lumber products. The chief manufacturing establishments are flour mills, lumber and planing mills, sugar-beet factory, sash and door factories, chicory factory, and salt works. It has also shipyards, foundry, and machine shops. In 1900 (government census) the city had 121 manufacturing establishments, which were capitalized for $2,323,910 and in which were 2,153 employees whose annual wages amounted to $868,504. The raw material used in the manufactories cost, each year, $2,294,668, and the value of the annual products was $3,763,522. The city owns and operates the electric-light plant and the waterworks. The educational institutions are a public high school, public and parish graded schools, and a public library. The two banks have a combined capital of $100,000. Bay City and West Bay City are practically one in industrial and commercial affairs. The government of West Bay City is administered under a charter of 1897 which provides for a mayor, who holds office two years, and a council.

WEST BEND, Wis.: city, county-seat of Washington co.; on the Milwaukee River, and on the Chicago & Northwestern Railroad; about 35 m. n. of Milwaukee. It is in an agricultural and stock-raising region. The chief manufactures are flour, beer, harnesses, spokes, hubs, and pocket-books. It has grain elevators, machine

shops, foundry, and creamery. There are six churches, public and parish schools, and one bank. Pop. about 2,200.

WEST'BORO, Mass.: town in Worcester co., on the Boston & Albany Railway, 12 m. e. of Worcester, 32 m. w. by s. of Boston. It contains five churches, a public library with 12,000 volumes, the Westboro Insane Hospital, the Lyman Reform School, a savings bank, a national bank, a weekly newspaper, and numerous important manufacturing industries, the chief being those connected with straw and leather goods, boots and shoes, and automobiles. Westboro was settled about 1659, and at first known as Chauncy, but in 1717 it was incorporated under its present name. Pop. (1910) 5,446.

WEST BROMWICH, England: a manufacturing town in Staffordshire, between Wednesbury and Birmingham. The principal buildings include the town-hall with a massive tower; a number of fine modern churches; several chapels of different denominations; public schools; an institute, art and technical schools, a free library, and a hospital. There is a fine public park. West Bromwich has a share in the mining and manufacturing industries of this busy district, and has grown largely of late years, carrying on the manufacture of iron goods of various kinds, smelting, brass-founding, etc. Pop. (1901) 65,172.

WEST'BROOK, Maine: city in Cumberland co.; on the Presumpscott River, and on branches of the Boston & Maine and the Maine R.R.'s; 6 m. n.w. of Portland. Electric lines extend to Portland. The river furnishes considerable water-power, which is utilized by manufactories, chief of which are silk and cotton mills, paper and flour mills, and machine shops. The silk and cotton products are mainly dress goods, cotton warp, and seamless bags. In 1900 (government census) Westbrook had 42 manufacturing establishments, which were capitalized for $3,950,221, and in which were 1,405 employees. The raw material cost annually $1,372,166, and the finished products were valued at $2,851,660. The bank has a capital of $50,000. The city has eight churches, the Presentation Convent, a high school, public and parish elementary schools, and the Walker Memorial Library. Pop. (1900) 7,283; (1910) 8,281.

WESTBURY, *wĕst'bĕr-ĭ:* borough of Wiltshire, England; 20 m. n.w. of Salisbury; on the w. declivity of Salisbury Plain. Its church—the older parts at least—was erected in the 13th century. Westbury is in a region interesting from its many antiquities. The inhabitants are employed chiefly in agriculture, the manufacture of woolen cloth of a superior quality, and the smelting of iron ore, extensive mines of which are near the town.—Pop. (1901) 3,300.

WESTBURY, Richard Bethell, Baron: English jurist and statesman: b. Bradford-on-Avon, Wiltshire,

1800, June 30; d. London 1873, July 20. Graduated from Oxford in 1818, he was admitted to the bar at the Middle Temple in 1833, in 1852 became solicitor-general, and in 1856-8 was attorney-general under Lord Palmerston. This post he held a second time, in 1859-61, and in 1861 he became lord-chancellor. As chancellor he did much by his decisions to aid the development of British equity jurisprudence, especially so in joint stock-company law, ecclesiastical appeals, and patent law.

WEST CHESTER, Pa.: borough, county-seat of Chester co.; on the Wilmington & B. and the Philadelphia R.R.'s; about 27 m. w. of Philadelphia. It was originally called Turk's Head, but in 1786 the county was divided, and the name was changed to West Chester when it was made the county-seat. The new county was called Delaware, but it retained the old county-seat, Chester. West Chester has a number of manufacturing establishments, among which are carriage factories, creameries, sash and door factories, and manufactories of hosiery, umbrella tags, and wood products. The principal public buildings are the Chester County Hospital, the county court-house, prison, theatres, a large convent, and the municipal buildings. Marshall square contains a soldiers' monument and a handsome fountain. The educational institutions are a State Normal School, Villa Maria Academy, Friends' Select School, the Darlington Seminary, West Chester Business College, a public high school established in 1865, public and parish schools, a public library, a law library and three school libraries. There are eight banks; the three national and one of the state banks have a combined capital of $650,000, and the five (national and state) have (1903) deposits amounting to $2,864,050. Pop. (1900) 9,524; (1910) 11,767.

WESTCOTT, *wĕst'kŏt*, Brooke Foss: English bishop and theologian: b. Birmingham 1825, Jan.; d. Bishop Auckland 1901, July 27. He was graduated from Trinity College, Cambridge, in 1848, was elected a fellow of his college in 1849, and in 1851 was ordained in the English Church. He was assistant master at Harrow 1852-69, and here he remained till 1869, when he became a residentiary canon of Peterborough. He became canon of Westminster in 1883, and on the death of his friend Lightfoot, bishop of Durham, was appointed his successor in 1890, and in this see he remained till his death. He showed a deep interest in the lot of the miners in his diocese, which won him their genuine esteem, and he was very successful in preventing and settling industrial disputes. As a textual critic he is best known for his share in the revision of the Greek text of the New Testament, which occupied him and J. F. A. Hort for 28 years, and resulted in the publication of their important work, *The New Testament in the Original Greek*, in 1881. The text formed the basis of the Revised

Version of the New Testament. His other published works include among others: *General Survey of the History of the Canon of the New Testament During the First Four Centuries* (1855), a standard work which has gone through many editions; *Introduction to the Study of the Gospels* (1860), another work of much value which has gone through numerous editions; *A General View of the History of the English Bible* (1868); *The Paragraph Psalter* (1879); *The Revelation of the Risen Lord* (1882); *Christus Consummator: Some Aspects of the Work and Person of Christ in Relation to Modern Thought* (1886); *Social Aspects of Christianity* (1887); *Essays in the History of Religious Thought in the West* (1891), a work of profound and suggestive thought; *The Gospel of Life* (1892); *The Incarnation and Common Life* (1893); *Lessons of the Revised Version of the New Testament* (3d ed., 1898); *Christian Aspects of Life* (2d ed., 1897); *Lessons from Work* (1901); and *Words of Faith and Hope* (1902). He was one of the New Testament revision company.

WESTCOTT, Edward Noyes: American novelist: b. Syracuse, N. Y., 1847, Sept. 27; d. there 1898, Mar. 31. He was a banker in his native city, but compelled to retire because of failing health, spent the winter of 1895-6 in Italy and in the latter year completed the novel *David Harum,* which he had begun soon after his retirement from business. It was declined by many leading publishers, but when issued in the autumn of 1898, six months after the author's death, became at once a success, reaching a sale of 400,000 copies in a little more than a year. The construction of the novel is weak, but it is a faithful reflection of certain phases of life in central New York, and its humor is undeniable.

WES'TERLY, R. I.: town in Washington co.; on the Pawcatuck River, and on the New York, New Haven & Hartford Railroad. It is in the s.w. part of the state, near Long Island Sound. The Indian name, which for a time was retained by the white settlers, was Misquamicut. In 1669, May 14, the town was incorporated, under its present name. In 1686 the name was changed to Haversham, and in 1689 it was re-named Westerly. The town contains five villages, each with its own postoffice. Noyes' Beach and Watch Hill are favorite summer resorts. The chief manufacturing establishments are cotton and woolen mills. The granite quarries of the town are known for the quality and amount of their products. There are six banks; the three savings banks have (1903) deposits amounting to $4,231,700. Pop. (1890) 6,813; (1900) 7,541; (1910) 8,696.

WES'TERN AUSTRALIA: British colony, forming the section (more than one-third) of Australia west of the 129th meridian; extreme length, northeast to southwest, 1,400 miles; average breadth, 850 miles; 1,060,000

square miles. This colony was formed 1829, and was formerly named *Swan River Settlement,* from the river Swan, which joins the Indian Ocean after watering a considerable district in the extreme s.w. Three mountain ranges rising from the coast inland run parallel with each other from s. to n., the highest summit being 5,000 ft. above sea-level. The climate is agreeable and salubrious; the soil, on the coast and in the interior, is light and dry. The most productive regions are in the s.w. and w., where there are large areas of eucalyptus, sandalwood, jarrah, karri and other trees yielding good and serviceable timber. The forests of jarrah trees cover 1,000 sq.m. These trees are used largely for railroad sleepers. It is found that the wood of the jarrah tree resists the white ant on land and the ship-worm at sea. The sandalwood is largely exported to China for incense purposes. Rivers, of which the Swan is the chief, abound; but are of little use for navigation. They include the Murray, the Murchison (400 m.), the Gascoigne (200 m.), the Moore, the Greenough, Ashburton, Fortescue, De Grey, Fitzroy, Ord, etc. Western Australia became part of the commonwealth of Australia 1901, Jan. 1. It is divided into districts—the Central, Central Eastern, Eastern, North, and Kimberley: cap. Perth. In the Kimberley district there are 20,000,000 acres of well watered land. Along the west coast are pearl-oyster fisheries employing a large fleet of boats.

The ordinary crops of the n. temperate zone, such as wheat, barley, oats, maize, hay, etc., do well throughout the region. Apples, peaches, oranges, lemons, grapes and other fruits all grow in abundance, also nearly every flower known to other countries. The total area under cultivation is 283,752 acres, of which area 137,946 acres was under wheat, yielding 1,876,252 bushels. The live-stock, 1903, included 2,599,633 sheep, 497,617 cattle, 82,747 horses, many pigs and goats and 2,031 camels. The wool clip of 1903 was 12,501,804 lbs. The chief resources of the country are wool, timber, and minerals. These represent the greatest wealth. There are mineral deposits scattered over a great area, much of which is as yet untouched. Gold is found at several points in the n. and n.w., in the w. and in the s. Gold was first discovered in Western Australia in 1886. The gold output from that date, to and including 1903, was 10,933,141 fine ounces. The gold output of 1903 alone was 2,064,801 fine ounces. Lead and copper are abundant and iron is available in any quantity.

The education of children and of youth is carefully watched in Western Australia. There are more than 380 schools supported and assisted by the government. These schools have an average attendance of 28,000.

The imports of Western Australia, 1904, amounted to $33,362,400; exports, $51,377,555.

The colony became (1849), at the request of the colonists, a settlement for convicts, and has much benefited by their labor, a great extent of road and many public buildings having been constructed by them. In 1868, however, the system of transportation to Western Australia was discontinued. Though Western Australia has a coast-line of 3,500 m., it has few safe harbors. Pop. (1891) 49,782; (1901) 184,124.

WESTERN CHURCH: in *chh. hist.*, the Latin as distinguished from the Greek Church; the Roman Church.

WESTERN COLLEGE: located at Toledo, Iowa. It was founded by the Iowa Conference of the United Brethren in Christ: was incorporated in 1856; and was opened to students in 1857. It was first located at Western, Linn co., but was moved to Toledo in 1881. In 1889 the main building was destroyed by fire, but was immediately rebuilt. The board of trustees consists of representatives of the alumni and of five conferences of the United Brethren, and three members-at-large. The college is open to men and women on equal terms. The buildings include the main building, the Bright Conservatory of Music, Mary Beatly Hall (the dormitory for young women), Drury Hall (the young men's dormitory), and the College Church. In 1902 a movement was begun for securing an endowment fund of $150,000. The library contains 3,500 volumes; the students number 259, and the faculty 14.

WESTERN EMPIRE, The: the western portion of the Roman Empire, consisting of Italy, Illyricum, Spain, Gaul, Britain, and Africa, as distinguished from the Eastern or Byzantine Empire, comprising the eastern half of the Balkan Peninsula, Greece, Egypt, Syria, and Asia Minor, so far as Persia. This partition of the Roman Empire occurred in 364 when Valentinian I. shared the imperial authority with his brother Valens, who ruled in Constantinople as Emperor of the East, while Valentinian ruled in Rome as Emperor of the West. The partition became final in 395 when Theodosius the Great divided the Roman world between his two sons Honorius, who became Emperor of Rome and the West, and Arcadius, who became Emperor of Constantinople and the East. The Western Empire terminated in 476.

WESTERN FEDERATION OF MINERS: an organization including all workers in and around mines, mills, and smelters, for the improvement of their industrial and social condition. The Federation opposes the truck system, child labor, contract labor, and the use of the injunction in strikes, and has made special endeavor to obtain the eight-hour day for all workers. The executive officers are a president, a treasurer, and a secretary; there is also an organizer for each district (six in 1904); and these officers constitute the executive board. The Federation holds annual conventions and also provides

for referring questions of policy and government to a referendum vote of the members. The executive board must approve every strike before it receives the support of the union. The Federation is a radical and militant organization, it endorses Socialism, and political action by workingmen. Its motto, which appears on the back of every union membership card, is 'Labor produces all wealth; wealth belongs to the producers thereof.' Its official organ is the *Miners' Magazine*. It was organized in 1893, and took the lead in the organization of the American Labor Union with which it is now affiliated.

WESTERN ISLANDS: See AZORES; HEBRIDES.

WESTERN MARYLAND COLLEGE: located at Westminster, Md. It was founded under the auspices of the Methodist Protestant Church, and was first opened to students in 1867. It was the first college in the South to offer equal educational privileges to both sexes; but it is not strictly co-educational, as there are separate classes for women, though they are taught by the same instructors and have practically the same courses of study as the men. The campus contains 14 acres situated on elevated ground in the western part of the city. The main building consists of a central part, the original building, and five wings: (1) Owings Hall, extending back from the central part; (2) Smith Hall, extending to the east; (3) Hering Hall, extending to the west; (4) Ward Hall, a rear extension of Hering Hall; and (5) a rear extension of Smith Hall. Other buildings are the Yingling Gymnasium, Y. M. C. A. Hall, Baker Chapel, built of white stone, and Alumni Hall, containing a large assembly room, the halls of the literary societies, etc. The students number 250, and the faculty 24.

WESTERN RESERVE, or CONNECTICUT RESERVE: that portion of the Northwest Territory reserved by Connecticut when, in 1786, that state ceded to the United States other parts of the territory claimed under the charter of 1662, which granted to Connecticut lands limited east and west by the sea. This section of land is what is now included in the northeastern part of Ohio; it was all the territory between lat. 41° and 42° 2′ N., and extending 120 m. from the western boundary of Pennsylvania. In 1795-6 Connecticut sold this land, except 500,000 acres, to a number of men who established what was known as the Connecticut Land Company. At first settlers hesitated about purchasing any of the land on the 'Reserve,' fearing the validity of the title, but when the state of Connecticut yielded all claim to the government, there was no longer any doubt about the titles. There were a large number of colonists from Connecticut who settled on this 'Reserve,' counties were organized, 13 in all, which were in whole or in part from lands of the 'Reserve.' The people were characterized by their thrift, industry, and the manner in which they

established schools. A large part of the money received by Connecticut, for the sale of the lands, was set aside 'as a perpetual fund, the interest of which should be appropriated to the support of schools.' This school fund was the means of influencing in Ohio a unique system of education, in some respects different from that of any other state.

WESTERN RESERVE UNIVERSITY: located at Cleveland, Ohio, includes the College for Women, the Graduate School, the Medical School, the Law School, the Dental School, and the Library School. As a working, though not a corporate, part of Western Reserve University is Adelbert College of Western Reserve University. Adelbert College of Western Reserve University was founded as Western Reserve College in Hudson, 26 m. from Cleveland, in 1826. As the territory formerly belonged to Connecticut, and derived its name from being territory in the West reserved for special purposes, so also the influence of Connecticut's great college dominated in its establishment and during its first decades. In affiliation with the college at Hudson for many years was the Cleveland Medical School. Theological instruction was also given for many years, ceasing in 1853. In 1882 Western Reserve College was moved to Cleveland. Amasa Stone gave to the college the sum of $600,000. In recognition of the gift the college took the name of a beloved son of Mr. Stone, who died while a student at Yale, becoming Adelbert College of Western Reserve University. Subsequent gifts and bequests, together with gifts made by members of his family, have amounted to more than $1,100,000. In 1884 a university charter was obtained. The following departments, in addition to the Medical School, were established: In 1888 the College for Women, in 1892 the Dental School, the Law School and the Graduate School, and in 1903 the Library School. The Library School was endowed by a gift of $100,000 made by Andrew Carnegie.

In the general educational endeavor known as Western Reserve University are two administrative features of special significance. One lies in the co-ordinate method of education. A college for men, Adelbert College, and a college for women exist as essential members of the same university. Each has its own faculty and government. The two bodies of students are distinct. Each college has its endowment and buildings. The work in the sciences, however, is done in the same laboratories, but usually at different times. Professors in the same departments of the two institutions exchange courses of instruction to a certain extent. The co-ordinate method is in part a co-operative method. In a state and a part of the country noted for co-education, the method prevailing in Western Reserve University is conspicuously successful. A further significant method of administra-

tion relates to the co-operative course of study established between the Case School of Applied Science and Adelbert College. These two institutions are planted upon the same campus and each has its own board of trustees. But the two faculties have arranged a course of instruction covering five years, three of which are spent in pursuing the liberal studies of the undergraduate college (Adelbert College) and the last two years are spent in the technical school (Case School of Applied Science). At the conclusion of the five-year course a bachelor of arts and a bachelor of science degree are given. Through this method the advantages of the liberal course of study are conserved and the efficiency of the specialized course also gained.

WESTERN UNIVERSITY OF PENNSYLVANIA: located at Allegheny, Pa., with its professional schools at Pittsburg. It was founded in 1786 and chartered in 1787, thus being the second oldest institution of learning west of the Appalachian Mountains. In 1819 its curriculum was extended, and the name changed to Western University of Pennsylvania. At first it was located at Pittsburg, and the building was destroyed in the fire of 1845; a new building was erected, but also destroyed by fire in 1849; and the university was compelled to suspend work for five years. Since that time, it has largely increased its endowment and has been uniformly prosperous. In 1895 all courses of the university were opened to women. The students maintain a literary society, an athletic association, an electrical club, and glee and mandolin clubs. The Collegiate Department, the Engineering Department and School of Mines are located at Allegheny; the Observatory at Riverview Park, Allegheny, in buildings erected in 1902; the other departments are in the city of Pittsburg; the medical department has a clinical building, erected 1897, known as the Emma Kaufmann Clinic. The library in 1904 contained 20,000 volumes, including the Robert Watson Library, and the departmental libraries; in addition, the Carnegie libraries of Allegheny and Pittsburg are open to students, and the Allegheny County Law Library to law students. The students number 916, of whom 300 were in the medical department; the faculty numbered 120.

WEST'FIELD, Mass., town in Hampden co.; on the Westfield River, and on the Boston & A. and the New York, N. H. & H. R.R.'s; 9 m. w. of Springfield. The chief manufacturing establishments are machine-shops, paper mills, thread mills, bicycle and whip factories, and cigar factories. In 1900 (government census) the town had 186 manufacturing concerns, capitalized for $4,345,372 and employing 2,641 persons, to whom were paid annually $1,229,643. The total cost of raw material used annually was $2,401,460, and the value of the yearly

products was $5,072,074. From 1900 to 1904 there has been considerable increase in the amount of productions. The valley in which Westfield is located is noted for its beauty; the town has a park, Woronoco, an excellent water-supply, which is brought from Montgomery Mountain, 7 m. distant, and a good sewerage system. The water plant, completed in 1874, cost nearly $250,000. There are seven churches, the Massachusetts State Normal School, a public high school, established in 1855, public and parish elementary schools, kindergartens, and a public library, which contains nearly 20,000 volumes. There are four banks. Westfield is on the site of an Indian village which was called Woronoco. Pop. 16,044.

WESTFIELD, N. J.: village in Union co.; on the Central Railroad of New Jersey; about 20 m. s.w. of New York. It is mainly a residential village, in a beautiful location, on an elevation. The roads leading out into the country places are excellent. There are six churches, public and private schools, and a national bank. Pop. (1900) 12,310; (1910) 6,420.

WESTFIELD, N. Y.: village in Chautauqua co.; on the Chautauqua Creek, and on the New York, C. & St. L. and the Lake Shore & M. S. R.R.'s; about 60 m. s.w. of Buffalo, and 20 m. s.w. of Dunkirk. It is in an agricultural and fruit region, in which the chief products are grapes, apples, peaches, and pears. It has railroad shops, a grist-mill, and fruit-basket and crate factories. There are six churches, a union school and academy, which has two endowed scholarships, and a public library, founded by Hannah Patterson by a gift of $100,000. There is a national bank with a capital of $50,000. Pop. (1900) 2,430; (1910) 2,985.

WESTFIELD COLLEGE: located at Westfield, Ill. It was founded in 1861 under the auspices of the United Brethren. It confers the degree of A.B. for the completion of the four years' college course. In addition to the degree course there are normal and business courses and a preparatory department. In 1903 the grounds and buildings were valued at over $40,000. The income is derived mainly from tuition and incidental fees. The library contains over 3,000 volumes, the students numbered 249, and the faculty 11.

WEST'FORD, Mass.: town in Middlesex co.; on the Boston & Maine Railway, 6 m. s.w. of Lowell. It contains several villages, and has four churches and a public library. There are manufactures of woolen goods and machinery, and agriculture and granite-quarrying are carried on. Pop. (1900) 2,624; (1910) 2,851.

WEST HO'BOKEN, N. J.: town in Hudson co.; adjoining Hoboken and near Jersey City; about 1½ m. from the Hoboken ferry on the Hudson River. It is on elevated land which rises somewhat abruptly from the

land along the river at Hoboken. In 1900 (government census) the town had 177 manufacturing establishments, which were capitalized for $4,042,373 and in which there were 3,028 employees, to whom were paid annually, $1,248,244. The total cost of the raw material used annually was $2,829,789, and the value of the finished products was $5,491,760. The five silk factories were capitalized for $3,327,900. They used annually raw material which cost $2,117,267, and the value of the yearly products was $3,961,054. The principal public buildings are St. Michael's Monastery (Passionist Fathers) and the Dominican Convent. The educational institutions are a theological school, at the Monastery, for their own members, a high school established in 1897, public elementary schools, and two large parish schools. The Hudson Trust Company has a capital of $500,000. Pop. (1900) 23,049; (1910) 35,403.

WEST IN'DIES. See ANTILLES; also JAMAICA; CUBA; MARTINIQUE; BARBADOES; TRINIDAD; etc.

WES'TINGHOUSE, GEORGE: American inventor: b. Central Bridge, N. Y., 1846, Oct. 6. He entered the machine shop of his father, a manufacturer of agricultural implements, when very young and early evinced an inventive genius, designing at 15 a rotary engine. He served in the Union army in 1863-4, and in 1864-5 was assistant engineer in the United States navy, after which he studied at Union College for two years. He continued his interest in mechanics, his first invention of importance being a railway frog. In 1868 he introduced the famous Westinghouse brake, which he has since developed to a remarkable degree of efficiency, and which has come into international use. He was one of the pioneers in introducing alternating-current machinery, and he succeeded in securing the use of this method at the Chicago Exposition in 1893. He has also made numerous improvements in railroad signaling, and through his devices the safety of high-speed railway traveling has been greatly increased. He has erected extensive works in this country and abroad for the manufacture of his various inventions, and is president of numerous corporations. He received the Order of Leopold from the Belgian king in 1884, and in 1889 the Royal Order of the Crown from the king of Italy. He was also decorated with the French Legion of Honor.

WEST'LAND, New Zealand: a provincial district in South Island, bounded n. by Nelson district, s. by Otago, w. by the ocean, and e. by Canterbury, from which it is separated by the chain of the Southern Alps. It is about 200 m. long and about 30 m. in average breadth, its area being about 4,642 sq.m. It consists principally of hills branching off from the great alpine system, intersected by narrow bush-clad valleys, and merging coastward into undulating plateaus, river valleys, and shelving coasts.

MAP OF
WEST INDIES
CENTRAL AMERICA
AND
NORTHERN PART OF SOUTH AMERICA
Scale of Miles
0 100 200 300 400
Engraved by the Atlas Eng., Co.
Longitude West from Greenwich
TROPIC OF CANCER
GULF OF MEXICO
CARIBBEAN SEA
ATLANTIC OCEAN
PACIFIC OCEAN
CUBA
HAVANA
Matanzas
Cardenas
Pinar del Rio
Guines
Colon
Santa Clara
Cienfuegos
I. OF PINES
Camaguey
Sta. Cruz
Manzanillo
Bayamo
Holguin
Baracoa
Gt. Bahama I.
Abaco I.
Nassau
Andros I.
Eleuthera I.
Cat I.
San Salvador or Watling I.
Rum Cay
Long I.
Crooked I.
Acklin I.
Mariguana I.
Caicos Is.
Great Inagua
Mortimer
Vibara
Guevitas
Florida
Tampa
Tampa B.
Palmetto
Punta Gorda
Fort Lauderdale
Palm Beach
Miami
Key West
Progreso
Merida
Espita
Labcah
Lagartos
Yucatan Channel
S. Antonio
Ticul
Peto
Valladolid
Cozumel I.
Campeche
Corosal
Yalbas
Flores
Belize
Turneffe I.
Br. Honduras
G. of Honduras
Bay Islands
Truxillo
Izabal
Guatemala
San Pedro
Cropunto
Bens Bruss
San Carlos
Cape Gracias
Balwi
Tegucigalpa
Ocotal
Kara
Salvador
Nicaragua
Santa Clara
Chinandega
Granada
Caribtown
Managua
L. Nicaragua
Bluefields
San Juan del Norte
San Jose
Limon
Cartago
Costa Rica
P. Mala
Sixola
Belen
Colon
Porto Bello
Carto
Panama
Rey I.
Coiba I.
Santiago
Rese
Gulf of Panama
Gulf of Darien
Turbo
Pt. Gallinas
Santa Marta
Barranquilla
Cartagena
Maracaybo
Venezuela
Aruba
Curacao
Bonayre
Leeward Islands
Les Roques
Tortuga
Margarita
Tucacas
La Guayra
Barcelona
Carupano
Port of Spain
Trinidad
Pedernales
Barquisimeto
Pto. Cabello
Caracas
Maturin
Pt. Mocomoco
Sta. Barbara
Guaqare
Orinoco R.
San Fernando
Jamaica
Kingston
Aux Cayes
Port au Prince
Beata I.
Hope Bay
Falmouth
Lucea
C. Dame Marie
Gonaives
Gonave I.
Grand Cayman I
C. De Cruz
Santiago
Haiti
Santo Domingo
Port de Paix
Cape Haitien
Marisi
C.
Pto Plata
Santiago
C. S Rafael
Seybo
Ponce
S. German
Porto Rico
San Juan
St. Thomas I.
Anguilla
Virgin Is.
St. Croix
St. Christopher
Earbuda
Guadeloupe
Dominica
Ft. de France
Martinique
St. Lucia
St. Vincent
Barbados
Grenada

The rivers are numerous but short. Practically the whole of the district is covered with forest. Large tracts can be prepared easily for pastoral purposes, but there is little ground suitable for agriculture. Gold is found in the valleys of the rivers, especially in those of the Arahura and Waiho, and gold-bearing quartz is also worked in some places. Silver, copper, iron, and tin are among the other metallic treasures of the district, which has also yielded much coal, especially from the valley of the Grey. The climate is equable and temperate. This rainfall is heavy, and snow lies on the high mountains during much of the year. The capital is Hokitika, the other chief towns being Greymouth, Brunnerton, Kumara, and Ross. Railways connect Greymouth with Hokitika, Jackson, and Reefton (in Nelson district). Westland was formerly part of Canterbury district. Pop. (1901) 14,466.

WESTMACOTT, Richard: English sculptor; son of Sir Richard Westmacott; b. London 1799; d. there 1872, April 19. He studied under his father, and also in Italy 1820-6, and after returning to England rose to prominence in his art. In 1857 he succeeded his father as professor of sculpture at the Royal Academy, having become associate member of the Academy in 1838 and a full member in 1849. His style resembled that of his father in many respects. He published a *Handbook of Sculpture* (1864) and a pamphlet *On Coloring Statues.*

WESTMACOTT, Sir Richard: English sculptor: b. London 1775; d. there 1856, Sep. 1. He was the son of Richard Westmacott, also a sculptor, and was early trained to a knowledge of art by his father. In 1793 he was sent to Rome to study his profession under Canova, and there gained the annual gold medal for sculpture given by the pope at the Academy of St. Luke. He also obtained a first prize for sculpture at Florence, and was elected a member of the Academy there. In 1798 he returned to England, and rose rapidly into estimation as an artist. Many of the monuments in St. Paul's Cathedral are by him, and that building forms, in some respects, a gallery of his works. The figure of a Welsh girl in a monument to the memory of Lord Penrhyn, at Penrhyn, in North Wales, is considered by many as his best creation. He designed also the statue of Nelson in Birmingham, besides figures of Addison, Pitt, and many others. He became an associate of the Royal Academy in 1805, a full member in 1811, and in 1827 succeeded Flaxman as lecturer to the Academy on sculpture. He was knighted in 1837.

WESTMEATH, *wĕst'mēth:* inland county of Ireland, prov. of Leinster; having Meath on the e., Roscommon on the w., Cavan on the n., and King's co. on the s.; greatest length, e. to w., about 40 m.; greatest breadth, n. to s., about 35 m.; 708 sq.m., or 453,468 acres, of which 111,752 are under tillage. The surface is generally level, the

hilly district, in the n., not reaching higher elevation than 710 ft. Still, from the number of lakes, and the extent of wood in some districts, the scenery is in many places picturesque. Geologically, Westmeath belongs to the great central limestone series; yellow sandstone occurring in only two very limited districts. Of the numerous lakes, one chain belongs to the basin of the Shannon, which forms the w. boundary and separates Westmeath from Roscommon; the other toward the e., flows into the basin of the Boyne. The Shannon is navigable for steamboats throughout its course bounding this county; and inland navigation is further provided by the Royal canal, which traverses Westmeath from e. to w., and by a branch of the Grand canal. The county is traversed by the Midland and Great Western railway. The climate is mild and not very moist. The soil is a deep loam, producing herbage suited especially for fattening cattle. There is little tillage; scarcely a fourth part of the county being under crops (chiefly oats), much of the area being lake and bog. In addition to weekly markets, more than 70 fairs are held at different seasons. Westmeath is divided into 12 baronies, and contains 63 parishes and 1,356 town-lands. The chief towns are the assize town and capital, Mullingar, Moate, and Athlone, which is partly in the county of Roscommon. —Westmeath anciently formed a portion of the kingdom of Meath, but 1543 it was erected into a separate county, and at first included Longford and part of the King's County. Many antiquities of the Anglo-Norman period, and some of the Celtic, chiefly tumuli and raths, are found in this interesting county.—Pop. (1901) 61,629.

WEST'MINSTER: London, England, a metropolitan borough, formerly the ancient City and Liberty of Westminster, which still retains its civic title and certain privileges. Area, 2,502 acres. It is bounded on the s. and e. by the river Thames; e. by the city of London, from which it was separated by the former Temple Bar; n. by Holborn, Marylebone, and Paddington; and w. by Kensington and Chelsea. It is connected with Lambeth by Vauxhall, Lambeth, Westminster, and Waterloo bridges. The parliamentary borough of Westminster created by the act of 1885 is practically conterminous with the parish of Saint Margaret and Saint John the Evangelist, the remainder of the city constituting the parliamentary boroughs of Saint George, Hanover Square, and the Strand. The city contains some of the finest and most imposing buildings in London, and teems with historical and literary associations. All the metropolitan royal palaces are within its limits, and also Westminster Abbey, the House of Parliament, a fine modern Roman Catholic cathedral, the principal government buildings, the headquarters of the London county council and the metropolitan police force, the National Gallery, and the Tate Gallery, Burlington House, Somerset

House, and the new Caxton Hall, and the principal theatres and opera-houses.

The history of Westminster goes back to a very early period. It became a city when, in 1540, Henry VIII. made it the see of a bishop, and even though the see was suppressed ten years later it retained the right to the style of city. The only (Anglican) bishop of Westminster was Thomas Thirlby. Since 1831 a branch of the Grosvenor family has borne the title of marquis, and since 1874 of Duke of Westminster. In 1850 a Roman Catholic archiepiscopal see of Westminster was created by Pope Pius IX., the first occupant being Cardinal Wiseman. Pop. of city and metropolitan borough (1901) 183,011.

WESTMINSTER: city, county-seat of Carroll co., Md.; on the Western Maryland railroad (Wabash system), about 35 m. n.w. of Baltimore. Two new (1904) railroads are under consideration. The city is in an agricultural section, but it has considerable manufacturing interests. The chief industrial establishments are flour mills, carriage factories, canneries, and cigar factories. In the canning season about 500 employees are engaged in the canning factories. The place was settled in 1724 by persons from the n. of Ireland and a colony of English from Prince George co., of which at that time it was a part. Some Germans were also among the first settlers. The inhabitants at present are nearly all American born, descendants of Germans, Irish, English, Dutch, and French. Pop. 3,250.

WEST'MINSTER ASSEM'BLY. See Assembly of Divines; Creeds and Confessions.

WESTMINSTER COLLEGE: located at Fulton, Mo. It was founded in 1853 by the Missouri Synod of the Presbyterian church. Though badly crippled during the civil war by reduction in numbers and loss of endowment, the college continued its work throughout the war. In 1892 a bequest of nearly $120,000 for permanent endowment was received, and in 1897 the Alumni Association began a movement for further increase of this fund. In 1901 an amendment of the charter placed the college under the joint control of the Southern and the Northern synods of Missouri. The campus comprises 18 acres on a wooded slope bordering on Stinson creek. There are four buildings (1904). The library contains 7,000 volumes; the students number 141 and the faculty 11.

WESTMINSTER COLLEGE: located at New Wilmington, Pa. It was chartered in 1852, as Westminster Collegiate Institute under the auspices of the United Presbyterian church. The board of trustees now consists of 40 members, the majority of whom are elected by two synods of that church. The name was changed to Westminster College in 1892. The students maintain four literary societies. Any student taking more than

one study of the classical course is required to belong to one of these societies. There is no general athletic association, but a football association, baseball association, etc. The college has a pleasant situation on elevated ground, some parts of the campus commanding a fine view. The buildings are the main building, science hall, the ladies' hall, and the gymnasium. In 1902 a commission was organized by the synods in control for the raising of a semi-centennial endowment fund. The students number 289, of whom 173 were in the collegiate courses; the faculty numbered 13.

WESTMINSTER PALACE: London, England, an alternative name for the Houses of Parliament, perpetuated from the ancient palace built by Edward the Confessor as a royal residence, and which contained the various national administrative and judicial offices. With the exception of the great hall, the building was destroyed by fire in 1834. The site is occupied by the new palace of Westminster or Houses of Parliament.

WEST'MINSTER SCHOOL, or ST. PETER'S COLLEGE: school founded 1560 by Queen Elizabeth for instruction of 40 scholars in Latin, Greek, and Hebrew. See WESTMINSTER, THE CITY AND LIBERTY OF. It was reorganized under the Public Schools Act (1868), and is recognized as one of the 9 great public schools of England. Instruction is now given to about 200 boys.

WESTMORELAND, *wĕst-mōr'land:* northern inland county of England; bounded e. by Yorkshire, s. and w. by Lancashire, n. by Cumberland and Durham; length 42 m., breadth 40 m.; 505,864 acres. Tillage is mostly confined to the valleys. There is some lead-mining; the manufactures are unimportant. Westmoreland is mountainous. The chief summit is Helvellyn (3,055 ft.), partly in Cumberland. The other more important summits are Loughrigg Fell, Bowfell, Crossfell, and High Street and Langdale Pikes. Lakes remarkable for beauty occur. The chief are Windermere, partly belonging to Lancashire; and Ullswater, between Westmoreland and Cumberland. Moorlands are numerous and extensive; but along the courses of the Kent in the s., and the Eden in the n.—the principal streams—there are tracts of fertile land. The climate is mild and moist, often with much snow in winter, the deep drifts of which sometimes prove fatal to travellers on the mountain tracks. The soil is mostly a dry gravelly mold, favorable to culture of turnips, of which great crops are produced. Rich pasture-lands abound, and cattle, mostly of large size, are extensively reared. The county town is Appleby (on the Eden); other chief towns are Ambleside, Kendal, and Kirby-Lonsdale.—Pop. (1901) 64,411.

WESTON: town, county-seat of Lewis co., W. Va.; on the west fork of the Monongahela river, and on the West Virginia and Pittsburg railroad; about 78 m. s. by

e. of Wheeling and 71 m. s. by e. of Parkersburg. It is in an agricultural region, in which considerable attention is given to stock-raising. It has a flour mill, lumber and planing mill, and machine shops. A state hospital for the insane is located here. The two banks have a combined capital of $150,000. Pop. 2,600.

WESTON, *wĕs'ton,* EDWARD: electrician: b. England, 1850, May 9. He came to the United States 1870, was appointed chemist to a nickel-plating company, began studying electrical apparatus 1872, produced the first copper-coated carbons 1873, and established at Newark, N. J., the first plant in the United States for exclusive manufacture of dynamo-electric machinery 1875. He has since applied himself to the manufacture of dynamos and of arc and incandescent lighting apparatus. Weston was a charter member of the American Institute of Electrical Engineers, and its president 1888.

WES'TON, THOMAS: about 1575—after 1624; b. England. He was a merchant in London, and advanced money to the Pilgrims to aid them in fitting out the *Mayflower* expedition; and induced them to form a joint-stock company on nearly his own terms. But the company not proving as profitable to him as he expected, he soon sold his interest in it, and 1622 formed a new one under the grant given to Sir Ferdinando Gorges by the king. This company, composed of the roughest elements, landed at Plymouth 1622, June, and after remaining there two months, a burden to the weak and struggling colony, determined to settle at Wessagussett (now Weymouth). But they were idle, shiftless, and profligate to such a degree that even the Indians despised them and determined to attack them. Miles Standish, hearing of this, marched against the Indians, killed two of their chiefs, and carried a part of the colony back to Plymouth; the rest became scattered, some eventually returning to England. Weston arrived soon after this, and Robert Gorges, agent of Sir Ferdinando Gorges, endeavored to bring him to account for some of his unscrupulous proceedings; but Bradford and others interceded for him; his vessel, which Gorges had seized, was released, and he was permitted to sail for the coast of Va., and soon returned to England.

WESTON-SUPER-MARE, *wĕs'ton-sū'pėr-mā'rē:* seaport town and watering-place in Somerset co., Eng., on Uphill Bay, Bristol Channel; 138 m. w.s.w. of London, 20 m. s.w. of Bristol. A citadel, whose ruins are still visible, was here in the time of Edward the Confessor; but the town is entirely modern. Worlebury Hill, on which the citadel was built, protects it on the n. and e.; and this, with its bracing and dry air, has made it a desirable winter residence as well as a favorite resort, and many business men of Bristol have homes here. It is noted for its potteries, and sprat and herring fishing is an industry.—Pop. 20,000.

WESTPHALIA.

WESTPHALIA, *wĕst-fā'lĭ-a:* province of Prussia; bounded n.w. by Holland, n. by Hanover, e. by Hanover, Lippe-Detmold, Schaumburg-Lippe, Brunswick, and Hessen-Nassau, s.w. by the Rhine Province; greatest length 124 m., greatest breadth 110 m.; 7,800 sq.m. Westphalia is divided into three districts—Münster in the n.w., Minden in the n.e., Arnsberg in the s. The east presents vast plains covered with grain, while the n.w. is a flat expanse of uncultivated land. The climate is generally temperate. The chief rivers are the Weser, the Ems, the Lippe, and the Roer or Ruhr, each navigable for considerable part of its course. The prosperity of Westphalia is due chiefly to its flax crops, and to its mineral treasures, especially coal and iron. The chief industrial products are iron, and articles of iron, steel, and copper from the forges of Arnsberg; while manufacturing industry embraces flax-spinning and linen-weaving in Minden, and extensive production of woolen articles, stockings, and ribbons of esteemed quality. Exports consist of these products, and of meat, especially hams. The capital, Münster, had, till 1818, a university, now a higher academy.—Westphalia derives its name from the West-falen, a section of the great Saxon people, who migrated hither from the banks of the Elbe soon after the Christian era; and after the subjugation of the Saxons by Charlemagne, the deposed leader, Wittekind, was allowed to remain *Duke of the Engern and West-falen.* At this time the country called Westphalia (and occasionally *Sauerland*) comprised all Germany between the Weser, Rhine, and Ems; and soon afterward it was subjugated by the dukes of Lower Saxony, and held by them, till on the rebellion of Henry the Lion, 1179, the electoral archbishop of Cologne extended his sway over it. It then became one of the circles of the empire, and belonged to the Cologne electorate till 1802, when most of it was given to the Hesse-Darmstadt family. In 1807 arose the *kingdom of Westphalia;* which, besides a portion of Westphalia, included Electoral Hesse, Hanover, Brunswick, and portions of Upper Saxony. This kingdom, erected by Napoleon as preliminary to its incorporation into France, was given to his youngest brother, Jerome, who made Cassel his capital; and, despite the large French garrisons with which the country was burdened, and the extensive contributions in men and money which it was forced to pay to Napoleon, succeeded—by the establishment of the Code Napoleon, and by showing in various other ways his strong desire to promote the welfare of his new subjects—in acquiring their esteem. But the oppressive conscriptions and taxes for the behoof of the French army and treasury gradually increased in amount, and excited such resentment that Jeromes' life was several times threatened. The king repeatedly remonstrated with Napoleon, but without the slightest effect; and in spite of his efforts, the

'Continental System' was introduced into his states. In 1813 Jerome was driven from Cassel by the Russians; and though he returned for a few days, the defeat of Leipzig forced him to take shelter in France. By the treaty of Vienna, the states which had been joined to Westphalia, to form the kingdom, were restored to their former possessors, and Westphalia itself, except a portion which had been annexed to Hesse-Darmstadt, was united to Prussia.—Pop. (1900) 3,187,777.

WESTPHA'LIA, TREATY OF; or TREATY OF MUNSTER: treaty concluded 1648 at Münster and Osnabrück (towns in the circle of Westphalia), which put an end to the Thirty Years' War, restored tranquillity to Germany, established a new system of political equilibrium in Europe, and became the basis of all subsequent treaties till the French Revolution. The minor states of Germany had long desired cessation of hostilities; and as early as 1638, plenipotentiaries from Frence, Sweden, and the empire had assembled at Hamburg; but it was not till several years after that all parties agreed to Münster and Osnabrück as the places, and to 1642, Mar. 26, as the time of meeting of the congresses, which, however, did not open until 1644. The two places of meeting were chosen to avoid rivalry between France and Sweden for supremacy, to prevent collision between the Swedish representatives and the pope, and to separate the Roman Catholics from the Protestants. The representatives of France, the empire, Spain, and the Roman Catholics of Germany met at Münster under the mediation of the pope; and those of Sweden, the empire, and the Protestants of Germany under the mediation of the king of Denmark; the representatives of Spain, Portugal, the United Provinces, Savoy, Tuscany, Lorraine, Mantua, and Switzerland being also present; so that this congress included all the great European powers except Great Britain, and almost all the minor powers. It was not till Torstensohn's decisive campaign 1644-5 that negotiations began in earnest and the representatives made specific propositions. The successes of Turenne and Wrangel in s. Germany, and the capture of Prague by the Swedes under Königsmark 1648, July, at length overcame all the emperor's dilatoriness, and, the Osnabrück representatives having arrived at Münster a few days before, the treaty was finally signed there 1648, Oct. 24.

Its terms, as regards the Germanic empire, were as follows: the sovereignty and independence of the different state of the empire were fully recognized, and liberty was given them to contract any alliances with each other, or with foreign powers, if these were not against the emperor or the empire; all religious persecution in Germany was forbidden; the treaty of Passau and the religious peace of 1555 were confirmed; and with respect to the secularization of ecclesiastical benefices, everything was to remain in Austria as it was in 1624 (hence called

the *normal year*), and in the Palatinate, Baden, and Würtemberg as it was in 1618; the power of putting under the ban of the empire was to be exercised only with consent of the diet; and the Reformed were put on a footing of equality as to privileges with the Lutherans. The territorial changes were as follows: the Lower Palatinate was restored to the eldest son of the unfortunate 'Winter King' (Frederick V., Elector Palatine), and an eighth electorate was created in his favor; but the Upper Palatinate and Cham were given to Bavaria, on condition that, should the two states become united, one electorate was to be abolished (as happened 1777: see BAVARIA); part of Alsace was ceded to France; Upper Pomerania, Rügen with Stettin, Gartz, Damme, Golnau, the isle of Wollin, Peine, Schweine, and Divenau in Lower Pomerania, Wismar, the secularized archbishopric of Bremen as a duchy, and the bishopric of Verdun as a principality, were obtained by Sweden as fiefs of the empire, with three deliberative voices in the diet, and an indemnification of 5,000,000 crowns to be paid by the empire; Brandenburg obtained, as compensation for its cessions in Pomerania, the secularized archbishopric of Magdeburg as a duchy, and the bishoprics of Halberstadt, Minden, and Camin; Hanover and Mecklenburg were compensated for their share in these cessions by secularized church lands; and Hesse-Cassel obtained the rich abbacy of Hirschfeld, with 600,000 thalers. The independence of the United Provinces was recognized by Spain, and that of Switzerland by the empire. The pope's agent, Fabio Chigi (afterward Pope Alexander VII.), protested vigorously against the liberal alienation of the possessions of the Church, and withdrew; and the king of Denmark's mediation being stopped by his war with Sweden 1644, the treaty was concluded under the sole mediation of the republic of Venice; and France and Sweden guaranteed its execution. France, Sweden, and the Protestants were the *only* gainers by this treaty, which, by weakening the great central authority of the empire, destroyed its unity, allowed France, as one of the guarantors, a pretext for continual interference with its internal affairs, and gave the *coup de grace* to the independence of the remaining free cities of the empire.

WESTPHA'LIAN TRIBU'NALS. See FEMGERICHTE.

WEST PITT'SON: borough in Luzerne co., Pa.; on the Susquehanna river, opposite Pittston. Two bridges span the river and connect the borough with the city. It is mainly a residential borough, many of the men who do business in Pittston have their homes in West Pittston. In 1900 (government census) West Pittston had 35 manufacturing establishments, which were capitalized for $567,287 and whose output each year was valued at $621,996. Pop. (1900) 5,846; (1910) 6,848.

WEST PLAINS: city, county-seat of Howell co., Mo.;

on the Kansas City, Fort Scott and Memphis railroad; about 125 m. s. of Jefferson City. It is in a region where there are farming, fruit-growing, and lumbering interests. The city ships large quantities of apples, grapes, dairy and farm products, and lumber products. The two state banks have a combined capital of $55,000. Pop. 3,000.

WEST POINT: post-village, milit. post, and seat of the U. S. Milit. Acad.; in Highland tp., Orange co., N. Y.; on the Hudson river, and on the New York, Ontario and Western and the West Shore railroads; 52 m. n. of New York. As a milit. post West Point has had large importance since the beginning of the revolutionary war. It is in the s. angle of a sharp bend in the river, and its elevated, rocky site was most favorable for construction of fortifications that would command the passage of the river. Fort Clinton was built on the crest of the highest of three terraces, 188 ft. above the water, and spreading out in a plain more than a mile in circumference; and Fort Putnam on an eminence in the rear, 598 ft. above the river. Other works were laid out on Constitution Island, in the n. angle of the river bend, a rocky mass 130 ft. above the water. Crow Nest and Butler Hill are n.w. of the 'point' proper; Bull Hill and Breakneck are n.; Sugar-loaf Hill and Anthony's Nose are s.; and Fort Independence was 1 m. s. of the Nose. A heavy chain was buoyed across the river in the revolutionary war, and the British made many attempts to gain possession of the post, and once nearly succeeded through the treason of Benedict Arnold. The earliest fortifications on Constitution Island and on Pooplopen's creek were taken and demolished by the British 1777; but after Burgoyne's surrender they were abandoned. The defensive works were planned by Lieut.col. Radière, engineer, who was succeeded by Kosciusko, the Polish hero. Besides numerous redoubts and batteries, they included Forts Putnam, Clinton, Webb, Wyllis, and Meigs, and at the time of Arnold's treason they had cost about $3,000,000. Construction operations were continued till about 1794, but the works were never finished as planned. During 1891 the govt. expended $1,000,000 in improving the post, especially the grounds and buildings of the acad., and one of the most notable changes was the demolition of the old historic academic building, on the most prominent spot on the post, to make room for a new building, larger than the old one, that will cost $450,000. A new gymnasium was erected at the w. end of the barracks, a new cav. barracks near the cav. stables, and a new hospital for enlisted men in a large open field. The rare beauty of its location, the presence of the milit. acad., and the cemetery in which are buried the remains of many great milit. leaders, and the proximity of Cold Spring, Highland Falls, Stony Point, Verplanck's Point, Cornwall, Newburgh, and other summer resorts,

have given West Point much popularity as a place for summer excursions and residence.

WEST POINT: city in Troup co., Ga.; on the Chattahoochee river, and on the Atlanta and W. P., and the Western of Alabama railroads; about 85 m. s.w. of Atlanta. It is in an agricultural region in which cotton is one of the chief products. It has cotton gins, cotton-seed-oil mills, cotton factories, an iron foundry, and a machine shop. It has one bank which has a capital of $75,000. During part of the civil war it was a supply depot for the Confederate army. Pop. (1910) 1,906.

WEST POINT: town, county-seat of Clay co., Miss.; on the Mobile and O., the Southern, and the Illinois C. railroads; about 95 m. n. of Meridian. It was founded in 1857. It is in an agricultural region in which cotton is one of the principal products. The chief industrial establishments are wagon and carriage factories, foundries, machine shops, brick and tile works, lumber mills, sash, door and blind factories, ice factory, milling and ginning establishment, and manufactories of electro-light dynamos. It has six churches, the West Point Military Academy, the Southern Female College, and elementary schools. There is a national bank which has a capital of $75,000. Pop. (1900) 3,193; (1910) 4,864.

WEST POINT: town, county-seat of Cuming co., Neb.; on the Elkhorn river, and on the Fremont, Elkhorn and Missouri Valley railroad; about 36 m. n.w. of Fremont and 75 m. n.w. of Omaha. It is in an agricultural region, in which the chief products are wheat and corn. It has a flour mill, creamery, grain elevator, carriage and furniture factories, stock-yards, and coal and lumber yards. The two national banks have a combined capital of $100,000, and a state bank has a capital of $30,000. There are a high school and graded schools and a school library. Pop. 2,000.

WEST POINT: town in King William co., Va.; at the junction of the Pamunkey, Mattapony, and York rivers; at terminus of the Richmond and Danville railroad; 38 m. e. of Richmond; in a region which was the scene of memorable events in the civil war. West Point ranked 1890 as the 6th cotton-shipping port in the United States. It has extensive docks and wharves, is supplied with water for drinking and cooking by about 200 artesian wells, and does a large business in lumbering, canning oysters, and manufacturing fertilizers from phosphatic marl and potash deposits on the Pamunkey. There are cotton compresses, oyster-packing houses, hosiery-mill, planing-mill, and tinware-works; 2 female seminaries, male academy, several public and private schools, and large hotel and sanitarium; regular steamship communication with Baltimore, New York, and Boston; gas and electric light plants.—Pop. (1910) 1,397.

WEST'PORT: town in Fairfield co., Conn.; on Long

Island sound at the mouth of the Saugatuck river, and on the New York, New Haven and Hartford railroad. It was established from portions of the towns of Weston, Fairfield, and Norwalk. Westport contains three villages. It is in an agricultural region, and has a number of industrial establishments, chief of which are cotton-twine and button factories, machine shops, and manufactories of satchels and morocco. It has a high school, elementary schools, and a public library. There are two banks. The national bank has a capital of $100,000. Pop. (1900) 4,017; (1910) 4,259.

WESTPORT, *wĕst'pōrt:* small seaport of Ireland, province of Connaught, county Mayo; at the mouth of a small stream that falls into Clew Bay; about 35 m. n.n.w. of Galway. Formerly Westport was supported principally by linen manufactures; but is now known mostly for its trade in grain and provisions, and for its facilities for sea-bathing. In the immediate vicinity is the Reek, a mountain 2,510 ft. high.—Pop. 4,469.

WEST PRUSSIA. See PRUSSIA, PROVINCE OF.

WEST RUT'LAND: town in Rutland co., Vt.; on Otter creek, and on the Delaware and Hudson railroad; about 55 m. s.w. of Montpelier, the capital of the state. In 1887 it was set off from Rutland (q.v.) and organized as a separate town. The principal marble quarries, for which this region is famous, are in West Rutland. It has seven churches, graded schools, and a library. It is one with Rutland except in government. Pop. (1900) 2,914; (1910) 3,427.

WEST SPRING'FIELD: town in Hampden co., Mass.; on the Connecticut river, and on the Boston and Albany railroad; opposite Springfield. It was settled about 1655 and at first was a part of Springfield. In 1774 it was incorporated. It is mainly a residential town, many of the business men of Springfield have their homes here. There are several industrial establishments, chief of which are paper mills, railroad repair shops, and machine shops. Many of the people are interested in market gardening. The public library has about 8,000 volumes. Pop. (1890) 5,077; (1900) 7,105; (1910) 9,224.

WEST TROY: a former village in Albany co., N. Y., on the Hudson river, and on the Dela. and Hudson Co.'s railroad; opposite Troy. It is connected with Troy by a bridge and steam-ferry, and, besides being at one of the entrances of the Erie and Champlain canals into the Hudson, is at the head of navigation on the river. It thus has direct water-communication with New York and with the shipping-points on Lakes Champlain, Erie, and Ontario. The principal trade is in lumber, shipped by canal directly from Mich.; but it has manufactories of car-boxes, bells, butts and hinges, woolen shawls, horse-cars, stoves, hollow-ware, and lime and cement. It has gas and electric light plants, 12 churches, 4 public

schools, 3 seminaries, 1 national bank (cap. $100,000), and 1 weekly newspaper. West Troy was (prior to 1896) the largest village in the state, when the town of Watervliet, with the villages of Green Island and West Troy was chartered as a city, under the name of Watervliet. It is the seat of the Watervliet U. S. arsenal, which occupies 105 acres in the centre of the village, and manufactures large quantities of army equipments and ordnance. Pop. (1890) 12,967; (1910) 15,074.

WEST UNION: city, county-seat of Fayette co., Iowa: on the Chicago, M. and St. P. and on the Burlington, C. R. and N. railroads; about 85 m. n.w. of Dubuque. It is in an agricultural and stock-raising region. It has large creameries, flour mill, and stock-yards. There are three banks which have a combined capital of $180,000 and (1903) deposits amounting to $411,760. Pop. (1890) 1,676; (1900) 1,935; (1910 est.) 2,170.

WEST VIRGINIA: state; one of the United States of America; 35th in order of admission into the Union, 22d under the federal constitution; created a state from 39 w. counties of Virginia, and admitted 1863, June 20; popularly known as 'The Panhandle State,' also as 'The Mountain State.'

Location and Area.—West Virginia is in lat. 37° 6′—40° 40′ n., long. 77° 40′—82° 35′ w.; bounded n.w. by Ohio, n. and n.e. by Pennsylvania and Maryland, e., s.e. and s. by Virginia, w. by Kentucky and Ohio; extreme breadth, e. to w., 160 m.; extreme length, n. to s., 240 m.; land surface 24,645 sq.m., water surface 135 sq.m., gross area 24,780 sq.m. (15859, 200 acres); cap. Charleston.

Topography.—In general the surface is mountainous and the soil clay. A narrow strip between the Pennsylvania boundary and the Ohio river is known as the 'Panhandle' and is very fertile. The Shenandoah valley or valley of Virginia includes the counties bordering on the Potomac river, and w. of this is the Appalachian country, which shows high mountain ridges with intervening valleys of much fertility. The 'hilly' region succeeds this and extends to the Ohio river. The highest elevations are on the Alleghany range, which forms the e. boundary and has peaks averaging 2,500 ft. high. A continuation of the Cumberland range is nearly parallel to the Alleghanies on the w., and 20-40 m. distant; and this contains many noted elevations, among them Flat Top, Greenbrier, Cotton Hill, Gauley, Laurel Hill, and Birch and Rich Mountains. The Ohio river furnishes steam-navigation along the whole w. boundary, about 300 m., and receives all the principal streams of the state, except the Potomac and its affluents. The largest rivers flowing into the Ohio are the Guyandotte, Great Kanawha, Little Kanawha, Big Sandy, and the Monongahela, all navigable and affording valuable water-power.

Area in Square Miles, 24,780.
Number of Counties, 55.
Population, 958,800.
Capital of State, Charleston.
WEST VIRGINIA
SCALE OF MILES
0 10 20 30 40
CHARLESTON
Wheeling
Parkersburg
Clarksburg
Fairmont
Grafton
Martinsburg
Huntington
Ohio R.
Big Sandy R.
Kanawha R.
New R.
Potomac R.
James R.
Shenandoah R.
Monongahela R.
Cheat R.
Tug Fork of Big Sandy R.
Guyandotte R.
Hocking R.
Little Kanawha R.
Middle Island Creek
Hughes R.
Elk R.
Gauley R.
Greenbrier R.
Meadow R.
Bluestone R.
Blue Ridge Mts.
Alleghany Mts.
Cumberland Mts.
Kanawha Falls
Hinton
Bluefield
Lynchburg
Roanoke
Buchanan
Newcastle
Covington
Lexington
Staunton
Harrisonburg
Winchester
Martinsburg
Charlestown
Shepherdstown
Harpers Ferry
Front Royal
Warrenton
Gordonsville
Charlottesville
Orange
Luray
Woodstock
Timberville
Franklin
Petersburg
Romney
Keyser
Piedmont
Cumberland
Hagerstown
Sir Johns Run
Berkeley Sprs.
Bedington
Kearneysville
Darkesville
Shenandoah Jc.
Hedgesville
Magnolia
Green Spring
Springfield
Augusta
Purgitsville
Capon Springs
Moorefield
Petersburg
Elk Garden
Terra Alta
Bittinger
Ridgeley
Gt. Cacapon
Potomac
Pawpaw
Aurora
Rowlesburg
Independence
Kingwood
Tunnelton
Newburg
Shinnston
Glen Falls
Webster
Bridgeport
Mt. Clare
Lostcreek
Simpson
Parsons
Phillippi
Thomas
Davis
Hambleton
Hendricks
Harman
Elkins
Weaver
Buckhannon
Weston
Volga
Janelew
Auburn
Macfarlan
Grantsville
Glenville
Dekalb
Roanoke
Sugo
Coalton
Beverly
Horton
Mill Creek
Selbyville
Alton
Burnsville
Confluence
Reedy
Kyger
Spencer
Sandyville
Millwood
Ravenswood
Newhaven
Hartford
Pomeroy
Palestine
Elizabeth
Cairo
Harrisville
Pennsboro
Ellenboro
Greenwood
W. Union
Morgansv
Longrun
Bristol
Brown
Wallace
Monongah
Barrackville
Middlebourne
Sistersville
Jacksonburg
Smithfield
Mannington
Pincgrove
Burton
Littleton
Hundred
Glovergap
Broad Tree
Proctor
New Martinsville
Efriendly
Raven Rock
St. Marys
Belmont
Waverly
Marietta
Athens
Belleville
Davisville
Kanawha Sta.
Petroleum
New Lexington
Caldwell
Chester
Fairview
New Cumberland
Hollidays Cove
Colliers
Steubenville
Lazearville
Wellsburg
Bethany
Valleygrove
Elmgrove
Benwood
McMechen
Glendale
Moundsville
Cameron
Broad Tree
Littleton
Dean
Proctor
Pt. Pleasant
Henderson
Cottageville
Evans
Ripley
Leon
Letart
Spilman
Clifton
Hartford
Newhaven
Pomeroy
Middleport
Syracuse
Rutland
Racine
Long Bottom
Portland
Buffalo
Winfield
Hurricane
Plymouth
Ashton
Cyanadotte
Barboursville
Huntington
Central City
Kenova
Ceredo
Lavalette
Sheridan
Wayne
Dunlow
Preston
Breading
Diggess
Naughtuck
Myrtle
Williamson
Matewan
Edgarton
Pikeville
Okeeffe
Panther
Sandy
Huff
Ashland
Arizona
Sylvan
Welch
Keystone
Landgraff
Powhattan
Bradshaw
Grundy
Berwind
Coalwood
Coopers
Bluefield
Princeton
Freeman
Oakvale
Salem
Roanoke
Red Sulphur Sprs.
Peterstown
Union
Salt Sulphur Sprs.
Alderson
Lowell
Ronceverte
Sulphur Sprs.
White
Lewisburg
Sulphur Sprs.
Blue Sulphur Sprs.
Rupert
Prince
Green
Falling Springs
Claremont
Beury
Glen Jean
Mt. Hope
Crow
New Richmond
Beckley
Lester
Oceana
Poplar
Logan
Chapmanville
Gordon
Lawson
Acmer
Deepwater
Powelton
Sewell
Nuttallburg
Kanawha Falls
Ansted
Cannellton
Ophelia
Seebert
Hunterville
Warm Springs
Buffalo Gap
Monterey
Cass
Webster Sprs.
Cowen
Lanes Bottom
Summersville
Delph
Richwood
Marlinton
Cloverlick
Dublin
Woodzell
Hosterman
Huttonsville
Right Fork
Pickens
Penbro
Flatwoods
Sutton
Gassaway
Heaters
Minnora
Newton
Odell
Walton
Clendenin
Clay
Yankeedam
Centralia
Jumbo
Patrick
Poca
Milton
St. Albans
Springhill
Garnet
Marmet
Lewiston
Diamond
Mammoth
Cedargrove
Belva
Hamlin
Midkiff
Peytona
Colburn
Crownhill
Montgomery
Mt. Carbon
Madison
Dunbar
South Charleston
Elkview
Clendenin
Big Otter
Sissonville
Cedar Grove
Belle
Nitro
Poca
Hurricane
Teays
Scott Depot
Hartford
Winfield
Eleanor
Buffalo
Point Pleasant
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Lewiston
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Belva
Hamlin
Midkiff
Peytona
Colburn
Crownhill
Montgomery
Mt. Carbon
Madison
Dunbar
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Elkview
Clendenin
Big Otter
Sissonville
Cedar Grove
Belle
Nitro
Poca
Hurricane
Teays
Scott Depot
Hartford
Winfield
Eleanor
Buffalo
Point Pleasant
Mason

The chief streams feeding the Potomac, which forms the n.e. boundary for 100 m., are the North and South branches. The valley of the Great Kanawha is an exceptionally rich grazing country, where the famous blue-grass is indigenous.

Climate.—The climate is remarkably equable, with no great extremes of heat or cold; mean annual temperature 52° 46′; average rainfall 35.75 in. in highest elevation, 55.84 in lowest.

Geology.—The principal economic properties of the state are coal, chiefly bituminous, but with some excellent cannel, coking, and gas coal; iron; sandstone; limestone; petroleum; salt; fire and potter's clays; plain and variegated marbles; buhrstone; and numerous mineral springs of large value and wide popularity. The coal-measures are believed to cover more than 15,000 sq.m.; the virgin forests about 9,000,000 acres. The principal woods are oak, poplar, hemlock, walnut, cherry, buttonwood, ash, chestnut, and locust. The soils range from clay to sand, loam, calcareous, and alluviums, both stream and upland; and even among the mountains are either highly productive or may be made so with slight cultivation.

Zoology.—Much of the animal life of Virginia is found here also. Game-birds include wild turkey, grouse, snipe, and woodcock; wild animals, panther, wild cat, black bear, wolf, raccoon, opossum, and ground-hog; and food animals, elk, deer, rabbit, and hare.

Oil and Gas.—Both petroleum and natural gas are found in immense quantities in the northwestern section of the state. The development of both is drifting toward the Kanawha Valley. The counties producing the greater part of the oil and gas are Ritchie, Wood, Wirt, Gilmer, Roane, Kanawha, Cabell, Lewis, Pleasants, Doddridge, Harrison, Tyler, Marion, Wetzel, Monongalia, Marshall and Hancock. The gas produced is worth about $600,000. It is conveyed by pipe lines to the principal cities of the state, to Cleveland, Pittsburg, and to other cities in adjoining states. In the production of crude petroleum West Virginia ranks first of the states. Most of the oil is piped to Philadelphia and Baltimore.

Agriculture.—There are about 100,000 farms in W. V., the total value of all farm property, including lands, buildings, and improvements, implements and machinery, and live stock, is about $250,000,000. The principal crops are corn, hay and forage, wheat, forest products, orchard fruits, and potatoes. All of these are very valuable, as, in slightly lesser degree, are the productions of small fruits and berries and tobacco. On most of the farms the principal source of income is stock-raising, which is remarkably profitable.

Manufactures.—There are about 7,000 manufacturing establishments with aggregate productions worth over $75,000,000 a year. Manufactures are located

chiefly in the n. part of the state and along the Ohio river. The principal industries are iron and steel; lumber and timber products; flour and grist milling; glass and coke.

Railroads.—There are more than 5,000 miles of railroad tracks in operation in W. V. divided among many important lines, such as the Baltimore & Ohio, Chesapeake & Ohio, the Wabash, etc. The great production of coke, coal, and lumber demanding transportation was the means of encouraging the rapid development of the railroad system. There is also an electric street railway system.

Finance and Banking.—The State has no debt, having refused to assume any of the debt of Virginia; the tax rate is $5 per $1,000; and the total assessed valuation of property, including both personal and realty, is $1,068,000,000. There are nearly 200 state banks in W. V. about 125 national banks, and a very few private and savings banks.

Libraries.—There are 1,082 school libraries of 37,495 volumes. There are few large libraries, most of them having less than 5,000 volumes. Those of more than that number are the Wheeling Public Library and the State Library at Charleston.

Education.—W. V. spends annually about $3,500,000 in the maintenance of its public schools, in which there are over 250,000 pupils enrolled, with about 8,500 teachers. Besides these there are normal schools for whites and colored, business colleges, and many private academies. The principal institutions for higher education are the State University, Bethany College, W. V. Wesleyan University; Salem College, Broaddus Institute, Lewisburg Female Institute, Morris Harvey College, Linsley Institute, and the Allegheny Collegiate Institute.

Charities and Corrections.—There are two hospitals for the insane at Weston and Spencer, respectively; a deaf, dumb, and blind school at Romney; a reform school for boys at Pruntyton; an asylum for incurables at Huntington; miners' hospitals at Welch, McKendree, and Fairmont; and a state penitentiary at Moundsville. This prison is more than self-supporting. The W. V. Humane Society cares for aged people, children and animals, being controlled by a board consisting of one member from each congressional district, appointed by the governor.

Churches.—The churches in West Virginia in order of membership are: Methodist Episcopal; Baptist (North); Methodist Episcopal (South); Roman Catholic; United Brethren; Methodist Protestant; Presbyterian, in the U. S.; Disciples; Presbyterian, in the U. S. A.; Colored Baptists, Regular; Protestant Episcopal; Freewill Baptists; Lutheran, United Synod, South; Lutheran, General Synod; Baptist (South).

History and Politics.—The region now embraced in West Virginia was first explored by Abraham Wood in 1671. Governor Spottswood came over the mountains in 1716, and to celebrate the crossing his party drank 11 different kinds of wine in what is now Pendleton co., and in 1725 John Van Meter explored the valley of the South Branch. In 1727 Morgan Morgan built the first cabin in what is now Berkeley co. After 1735 the South Branch Valley began to fill up with the overflow from the Shenandoah Valley and from Pennsylvania and Maryland. The settlers were of several nationalities—and the composition of the people of West Virginia has always been different from that of the country e. of the mountains. Some of the land in West Virginia was embraced in the 'Northern Neck' grant to Lord Fairfax, and his surveyors in 1746 planted the Fairfax stone at the head of the North Branch of the Potomac to mark the western limits of the grant. In 1768, after the expulsion of the French, who claimed the territory drained by the Ohio, the Six Nations sold the land to the English, though several other Indian tribes claimed the country. But within historic times no Indians have ever occupied any part of West Virginia. The attempts of the whites to take possession of these Indian lands led to bloody conflicts that lasted until after the Revolution. The West Virginians heartily supported the Revolution and sent troops to help New England and the Middle Colonies. The history of western Virginia before 1861 is a history of controversy with eastern Virginia. Socially, politically and economically, the two sections of the state were unlike from the first. Western Virginia was democratic; eastern Virginia was aristocratic, in institutions. The idea of separation was older than the Union, the Continental Congress had been petitioned to set up a state west of the Alleghanies; the people of the West were always ready for independence. The western counties complained that they were governed for the benefit of the eastern counties. Unlike Tennessee and Kentucky, western Virginia had to wait half a century for separate state existence. The crisis came during the secession movement in 1861. The Virginia convention passed the ordinance of secession, the delegates from the western counties opposing, and submitted it to the people. From 1860, Nov., to 1861, May, meetings were held in the western counties which made it clear that that section would not go with the South. An irregular convention of 26 counties met in Wheeling, 1861, May 13, and came near breaking away before the vote on the ordinance of secession. The western counties voted 40,000 against and 4,000 for secession. The second Wheeling convention, composed of the newly elected members of the legislature and irregularly elected delegates from the counties west of the mountains, met June 11, declared the ordinance of secession void, vacated the offices of the state of Vir-

ginia, and formed a 'reorganized' government of Virginia. The legislature, calling itself the Virginia legislature, elected senators for Virginia who were received at Washington. The convention made a provision for organizing a new state by calling a third convention at Wheeling on Nov. 26, in which 41 counties were represented. A constitution for the new state was formed and ratified by the people in 1862, April. It was at first proposed to call the new state Kanawha, but the name West Virginia was finally adopted. The 'Reorganized' government of 'Virginia' gave its consent to the erection of the new state, and in 1862, Dec. 31, Congress consented to admit West Virginia to the Union as soon as it should provide for gradual abolition of slavery. In 1863, June 19, the state was admitted to the Union, and the long desired separation was effected. The movement was not caused by the war; the war simply gave an opportunity to secure long-desired independence. During the civil war no important military operations were carried on in West Virginia. The Confederates early lost control of the state, but there were skirmishes and raids until near the end of the war. However, as compared with the other southern states, West Virginia suffered little. From the state about 29,000 soldiers entered the Union army, and about 10,000 went into the Confederate. Laws were passed by the legislature confiscating the property of Confederates, and after the war all Confederates and Confederate sympathizers were disfranchised from voting and holding office. In 1869 it was officially reported that 29,316 persons—nearly half of the voting population—were disfranchised. In the reaction against the Fourteenth Amendment, the Flick Amendment to the state constitution, which combined white enfranchisement with negro suffrage, was adopted. But before its adoption in 1871 the Democrats carried the state. Thus the liberal measures were proposed by the Republicans. The Democrats retained control of the state until 1897, when the Republicans carried the elections. The change in political complexion was due to the great industrial development of the state which attracted a heavy immigration from the states to the north and west. West Virginia was the first state to begin the undoing of reconstruction; and the first to break from the ranks of the 'Solid South.'

Government.—The executive authority is vested by the constitution (1862, amended 1872) in a governor, elected for 4 years and ineligible for a second consecutive term; and a secretary of state, treasurer, auditor, superintendent of schools, and attorney-general—all elected by the people at the same time and for the same term as the governor.—The legislative authority is vested in a general assembly, comprising a senate of 26 members, elected for 4 years, and a house of representatives of 69 members, elected for 2 years. The legislature meets bi-

AN EXTENSIVE PEACH ORCHARD IN WEST VIRGINIA.

ennially, in odd-numbered years, and sessions are limited to 45 days. Each branch of the legislature elects its own presiding officer, who receives mileage and $6 per day during the session. Every male person 21 years old who is a citizen of the United States and has been a resident of the state for one year and of the county 60 days, and is an actual resident of the precinct, is entitled to vote, except paupers, persons of unsound mind, and those convicted of treason, felony, or bribery at elections. The governor, judges, attorney-general, and state senators, to be eligible to their respective offices, must have been citizens of the state for 5 years prior to election or appointment. All principals and seconds in a duel are forever disqualified from holding offices of honor, trust, or profit in the state.—The judicial authority is vested in a supreme court of appeals of 4 judges, elected by the people for 12 years, salary of each $2,250 per annum; in a circuit court in each of the 9 judicial circuits into which the state is divided, the judges of which are elected for 8 years and receive $2,000 each per annum; in a county court of a president and 2 justices of the peace in each county, the president elected for 4 years; and in specific corporation courts and the usual subordinate officials. There are also sessions of the U. S. courts at Charleston, Clarksburg, Parkersburg, and Wheeling.

The successive governors, with their terms of service, are as follows: Arthur J. Boreman 1863-69; William E. Stevenson 1869-71; John J. Jacob 1871-77; Henry M. Mathews 1877-81; Jacob B. Jackson 1881-85; E. Willis Wilson 1885-90; A. B. Fleming 1890-93; William A. McCorkle 1893-97; G. W. Atkinson 1897-1901; A. B. White 1901-5; William M. O. Dawson 1905-9; William E. Glasscock 1909.

Politics.—State elections are held on second Tuesday in Oct.; congress and pres. on Tuesday after first Monday in Nov. West Virginia had 6 electoral votes under the apportionment on the 1880 census, and no change was made in the 1890 apportionment; 1904, 7 electoral votes. For the presidential vote, see PRESIDENT AND VICE-PRESIDENT, ELECTIONS OF.

Population.—(1870) white 424,033; colored 17,980—total 442,014; (1880) 618,457; (1890) 762,767; (1900) 958,800; (1910) 1,221,119.

Bibliography.—Lewis, *History of West Virginia* (1889); Lewis, *History and Government of West Virginia* (1896); Fast and Maxwell, *History and Government of West Virginia* (1901); Hagans, *Formation of West Virginia* (in West Virginia Supreme Court Reports, Vol. I.); Willey, *Formation of West Virginia* (1901); Hale, *Trans-Allegheny Pioneers* (1886); DeHass, *History of the Early Settlement and Indian Wars of Western Virginia* (1851); Jefferson, *Notes on the State of Virginia* (1833); Kercheval, *A History of the*

Valley of Virginia (1833); Maxwell, *Histories of Tucker, Barbour, Randolph and Hampshire Counties* (1884-1897); Withers, *Chronicles of Border Warfare.*

WEST VIRGINIA UNIVERSITY: the state university, located at Morgantown, W. Va. In 1814 the Monongalia Academy was incorporated by the Virginia legislature and located at Morgantown; and for 50 years was the leading school in the western part of Virginia. In 1864 the provisions of the land grant act of 1862 were extended to the new state of West Virginia, and in 1867 the West Virginia Agricultural College was founded. The property of the Monongalia Academy was then transferred to this college, and the new institution opened in Aug. 1867. In 1868 the name was changed to West Virginia University. It is open to women on equal terms with men. The university now comprises the following departments: (1) the College of Arts and Sciences; (2) the College of Engineering and Mechanic Arts; (3) the College of Agriculture; (4) the College of Law; (5) the College of Medicine; (6) the School of Music; (7) the Commercial School; (8) the School of Fine Arts; (9) the School of Military Science and Tactics; (10) the three preparatory schools at Morgantown, Montgomery, and Keyser. A summer school is also maintained. In the College of Arts and Sciences two courses are offered, the classical and the scientific, leading to the degrees of A.B. and B.S. Certain studies are required, but both courses are very largely elective; the subjects of study arranged in three groups, language, science, and philosophy (including history and pedagogy). Each student is required to elect a major nine courses in one group, a minor six courses in another group, and a subminor three courses in the remaining group; for the degree of B.S. the major must be in science. The degrees of A.M. and PH.D. are conferred for graduate work. The curriculum includes history and principles of education, school administration, and the art of teaching, courses in science and theory of music count toward the A.B. degree. The College of Engineering and Mechanic Art offers four years' courses in civil, mechanical, and electrical engineering leading to the degree of B.S.; and graduate courses leading to the degrees of C.E. and M.E. The undergraduate courses include general culture subjects; class room work is supplemented by practical field and shop work. There are also special courses in manual training for teachers, and in the mechanic arts for practical mechanics, electricians, etc. The College of Agriculture offers a four years' course leading to the degree of B.S. in agriculture, a two years' course leading to the degree of B.AGR., a one year's course in agriculture, and winter courses of 12 weeks in agriculture, animal industry, horticulture, and poultry raising. A dairy course was added in 1903-4. The College of Law offers a two years' course leading to the degree of LL.B. The

medical department is the College of Physicians and Surgeons of Baltimore, which is affiliated with the university; the course is four years; the first two years' work may be done at Morgantown or Baltimore, the last two years' work is done at Baltimore. The Woman's Medical College of Baltimore has also been affiliated with the university on the same terms. In the School of Military Science and Tactics, 225 state cadets are appointed and receive their equipment and tuition free; students of the university may join the cadet corps for military instruction. The military course is the same as that at West Point; the state cadets also take courses in other departments of the university. The Commercial School offers a full two years' course, including electives in the College of Arts and Sciences and the preparatory school; and shorter courses in special subjects, open to students in other departments. The Summer School offers courses in the general college subjects, and in education with special attention to methods, in law, fine arts, music, and commercial subjects. A special school of methods for Sunday school workers with a session of one week is also connected with the Summer School. The university is one of the institutions affiliated with the Central Oratorical League, a students' organization for the maintenance of a high standard in public speaking. The students also maintain literary societies, a choral society, an athletic association, and Farmers' Grange for the members of the College of Agriculture. The campus, consisting of 25 acres, occupies a picturesque site bordering on the Monongahela river; the buildings include Woodburn Hall, Martin Hall, Science Hall, Commencement Hall, Mechanical Hall, the Library (completed 1903), the Armory and Drill Hall, and the Agricultural Experiment Station. The library contains 21,000 volumes; in addition to which there are the libraries of the College of Law and of the experiment station, and the Willey Library. The income is derived mostly from the land grant endowment, the national appropriation for agricultural colleges, and the state appropriation. The students in all departments number about 1,100.

WEST'WOOD, John Obadiah: English entomologist and archæologist: b. Sheffield, England, 1805, Dec. 22; d. Oxford, England, 1893, Jan. 2. He devoted himself to sciences, making extensive researches in the fields of entomology and archæology; was one of the founders of the Entomological Society of London in 1833, and from 1883 its honorary life president. From 1861 until his death he was professor of invertebrate zoology at Oxford. His works on both entomology and English archæology are numerous and important. Among the former are: *The Entomologists' Text-Book* (1838); *Introduction to the Modern Classification of Insects* (1839-40); *Arcana Entomologica* (1841-5); *The Butterflies of Great Britain* (1855); *Catalogue of Orthopterous Insects in the British*

Museum, Part I., Phasmidæ (1859); *Thesaurus Entomologicus Oxoniensis* (1874); *Reviso Insectorum Familiæ Mantidorum* (1889); etc. His archæological works, which are enriched by his excellent reproductions of manuscripts and illuminations and also by his drawings of inscribed stones and old ivories, are well known. Among them are *Palæographia Sacria Pictoria* (1843-5); *Wood Carvings* (1864); *The Utrecht Psalter* (1874); *The Early Inscribed and Sculptured Stones of Wales* (1876-9); *The Book of Kells: a Lecture* (1887); etc.

WET, a. *wĕt* [AS. *wæt;* Dan. *vaad;* Icel. *vátr;* Sw. *wat,* wet (see also WATER)]: humid; damp; moist; having the pores saturated with water; rainy, as *wet* weather; drenched; in *slang,* tipsy: N. moisture; humidity; rain: V. to moisten; to sprinkle with water; to saturate with water. WET'TING, imp.: N. a being saturated or moistened with water. WET, or WETTED, pt. and pp. *wĕt* or *wĕt'tĕd.* WET'NESS, n. *-nĕs,* moisture; humidity; a watery or moist state of the atmosphere. WET'TISH, a. *-tĭsh,* somewhat wet; moist. WET-DOCK, a dock or large basin of water capable of receiving and floating vessels at all states of the tide. WET-NURSE, a nurse who suckles a child born of another woman. WET-SHOD, a. wet over the shoes.

WETHER, n. *wĕth'ēr,* or WEDDER, n. *wĕd'dēr* [AS. *wether;* Dan. *vædder;* Ger. *widder,* a wether]: a male sheep castrated when a lamb; a castrated man.

WETHERELL, EMMA (ABBOTT): soprano opera-singer: 1849, Dec. 9—1891, Jan. 5; b. Chicago, Ill. She first sang in public at the age of 9. Through the patronage and friendship of Clara Louise Kellogg she was enabled to go to New York 1870, where she was engaged in the choir of the Church of the Divine Paternity, a number of whose members 1872 contributed to send her abroad, and she studied for four years in Paris. She made her *début* in London 1876, as *Marguerite.* For refusing to take the part of *Violetta,* in *La Traviata,* on moral grounds, her engagement was cancelled. In 1874 she was married to Eugene Wetherell. She made her first appearance in New York 1877.

WETHERSFIELD: town Hartford co., Conn.; on the Connecticut river, and on the New York, New Haven and Hartford railroad; 3 m. s. of Hartford. In the summer it has regular steamer connections with New York and intermediate ports, and it is connected with Hartford and other near-by places by electric railways. It has manufactories of mattresses, copying presses, and agricultural implements. Important industries of the town are connected with the cultivation of seeds and the packing and shipping of the same. A historic building is the Webb house, where, in 1781, Washington and Rochambeau met. A state prison is located here. The educa-

tional institutions are a high school, public and private schools and a public library. Pop. (1910) 3,148.

WET'TE, De. See De Wette.

WETTER, *vĕt'tėr*, Lake: after Lake Wener, largest lake in Sweden; in Gothland, about 25 m. s e. of Lake Wener, 300 ft. above the level of the Baltic. It is 370 ft. in greatest depth; 70 m. long, 13 m. in average breadth; 850 sq.m. It receives about 90 small streams, though its waters have only one outlet, the Motala river, flowing e. to the Baltic. The waters are clear and of beautiful green color, and it is surrounded by lofty romantic shores, almost unbroken by bays. It is remarkable for an irregular alternation of risings and fallings, and for an occasional undulation, so rapid and violent as to break its thick winter covering of ice. An intricate chain of small lakes, continued westward by the Göta canal, connects Lake Wetter with Lake Wener, and thus with the Cattegat. Lake Wetter contains few islands; the chief is Wisingsö, 7 m. long by 1¼ m. broad.

WETTERHORN, *vĕt'tėr-horn* (Peak of Tempests): lofty mountain of the Bernese Oberland, Switzerland; on the e. side of the Grindelwald; about 10 m. s.e. of the Lake of Brienz. From the path by which it is ascended, it rises in one vast precipitous mass of alpine limestone. The three peaks of the Wetterhorn are respectively 12,149, 12,166, and 12,107 ft. above sea-level.

WEXFORD, *wĕks'fėrd:* maritime county of Ireland, prov. of Leinster; bounded n. by the county of Wicklow, e. by the English Channel, s. by the Atlantic, w. by the counties of Waterford, Kilkenny, and Carlow; greatest length n. and s. about 60 m.; greatest breadth e. and w. 34 m.; about 900 sq.m., or 576,588 acres. The coast-line of Wexford, from Kilmichael Point to the estuary of the Suir, Waterford Harbor, is irregular, and very dangerous for shipping, and offers no secure harbor. The headland called Carnsore Point is the s.e. extremity of Ireland. Parallel with the n. coast-line is a range of sand-banks; and the s. shores are beset by outlying rocks and islets, frequently fatal to shipping. The greater part of the surface is comparatively level, but with some detached hills. The mountains of the border are much higher, the highest point of the Blackstairs being 2,409 ft., and of Mt. Leinster 2,610 ft. There are a few small lakes. The principal river is the Slaney, entering the sea in Wexford Harbor. In geological structure, Wexford belongs to the e. clay slate tract. Granite is found in the s.e. and in some of the detached hills; there are also beds of greenstone. Silver was formerly mined near Clonmines, and galena has been found there. Copper ore is found at Kerlogue, near Wexford, and plumbago and asbestos near Enniscorthy. The climate is said to be singularly temperate, and the district is more suitable for agriculture than the counties of Car-

low and Kilkenny, though inferior in fertility. The breeds of livestock have been much improved. There are but few and inconsiderable manufactures, and the trade is chiefly in the export of agricultural produce, especially barley; butter, cattle, pigs, poultry, and eggs also are exported in large quantities. Wexford is divided into ten baronies, and contains 144 parishes and 1,600 townlands. The barony of Forth is remarkable as having preserved, from the 12th century till recent times, a dialect of English quite peculiar, as well as many usages and social habits. Duncannon is noticeable for its ancient fort and historical associations. The maritime position of Wexford early exposed it to the incursions of the Danes, to whom the name Wexford, or Weisford, is traced by antiquaries. It was the first landing-place of the English in the invasion (1169), and formed part of the tract granted to them by MacMurrough, the overlord of Leinster. By the marriage of Strongbow with Eva, MacBurrough's daughter, Wexford came into his hands; and after the partition of his lands among his daughters at his death, Wexford underwent many changes of masters. During the civil wars after 1641, Wexford was the scene of frequent contests; and in the more recent insurrection of 1798 it was the theatre of the only formidable conflicts of the peasantry with the regular troops. There are numerous relics of antiquity, Celtic as well as Anglo-Norman, in almost every part of the county. More than a hundred castles are still traceable, and many ecclesiastical remains, of which the monasteries of Dunbrody, Tintern, Ross, and some others are worthy of the best days of mediæval architecture.—Pop. (1901) 104,104.

WEX'FORD: seaport and parliamentary and municipal burgh of Ireland, cap. of the county of Wexford, at the mouth of the river Slaney; 74 m. s. of Dublin, with which it communicates by the Wicklow, Wexford and Waterford railway. The town is on the s.w. shore of the estuary of the Slaney, which is known as Wexford Harbor; and extends in two nearly parallel streets. There are two Protestant and three Roman Catholic churches. Of the latter, two are modern and handsome structures. One of the former, St. Selsker's, is ancient, part of its walls dating from the Eng. invasion (12th c.). There are also a Presbyterian, a Methodist, and a Quaker meeting-house; a convent of Franciscan friars, 5 nunneries, a Roman Catholic college, and national, Christian Brothers', and conventual schools. The only important manufactures are distillation and grinding of grain; the chief industry of the town being in connection with the export trade of the county. The harbor has been much improved in recent years. The principal exports are cattle, provisions, and whisky. The Wexford fisheries have long been reckoned among the most valuable on the e. coast.—The town is ancient, and was occu-

pied by the Danes as one of their strongest settlements. From the time of the invasion, it became an English stronghold against the native population. During the civil wars of 1641 it was occupied by the confederated Roman Catholics, but was taken by Cromwell 1644. The insurgents of 1798 also had possession of it for a short time.—Pop. (1901) 11,168.

WEY, n. *wā* [from WEIGH]: a unit of weight, varying with different articles; a *wey* of wool was equal to $6\frac{1}{2}$ tods, = 13 stone or 182 lbs.

WEYER'S CAVE, *wī'ėrz:* stalactite cave in the n.e. part of Augusta co., Va.; in a s.w. spur of the Blue Ridge Mts.; about 18 m. e.n.e. of Staunton. It ranks next in size and interest to Mammoth Cave, Ky., and Wyandotte Cave, Ind. It was named from Bernard Weyer, who discovered it 1804 while hunting. It contains a number of apartments; the largest, Washington's Hall, 250 ft. long, 90 ft. high, beautifully decorated with stalactites and stalagmites, as are also the other apartments. Near it is Madison's Cave, but smaller and of less interest.

WEYLER Y NICOLAU, *wā'lĕr, ē nē'kō-low,* VALERIANO, MARQUIS OF TENERIFFE: Spanish general: b. Palma, island of Majorca, 1838, Dec. 17. He was educated in Granada, entered the infantry school in 1853, and became under-lieutenant in the staff school in 1857. He was appointed lieutenant of the staff in 1860, and rose through higher ranks until in 1878 he became lieutenant-general. He was military attaché of the Spanish legation at Washington during the American civil war, and in 1868 was ordered to Cuba, where he served under Balmaceda through the ten years' war. He was appointed governor-general of the Canaries in 1879, captain-general of the Philippines in 1889, and was afterward provincial governor of Catalonia. He succeeded Martinez Campos as captain-general of Cuba in 1896, and by the perpetration of many barbarities added to an already infamous record for cruelty in the conduct of the war then being waged on the island. His inhuman methods aroused the indignation of the people of the United States, where he became known as 'Butcher Weyler,' and in 1897, upon the change of cabinets in Spain, he was recalled. In 1901-2 he was minister of war in Sagasta's cabinet.

WEYMAN, *wī'man,* STANLEY JOHN: English novelist: b. Ludlow, Shropshire, 1855, Aug. 7. He was educated at Shrewsbury School and Christ Church, Oxford, studied law, and was called to the bar in 1881. For nine years he practised on the Oxford circuit, and then began a literary career in 1890 by publishing a romance entitled *The House of the Wolf.* It was succeeded by *The New Rector* (1891) and *The Story of Francis Cludde* (1891), but it was his brilliant story, *A Gentleman of France* (1893), that first brought him into prominence, and on

his historical novels his reputation rests. His later works include *Under the Red Robe* (1894); *My Lady Rotha* (1894); *The Red Cockade* (1895); *The Man in Black* (1896); *Shrewsbury* (1897); *The Castle Inn* (1899); *Sophia* (1900); and *Count Hannibal* (1901). His tales are well constructed and written in a workmanlike manner, with plenty of incident and adventure, and the interest is well sustained.

WEYMOUTH, *wā'mŭth*, England: seaport in Dorsetshire, on a beautiful semicircular bay, 7 m. s. by s.w. of Dorchester. The borough comprises Melcombe-Regis, from which it is separated by the small river Wey. It is well built; has two parish churches, one of them in Melcombe-Regis; several other places of worship, a general and an eye infirmary, town-hall, reading-room, Victoria jubilee hall, libraries, etc. There is a considerable coasting trade, and an active traffic, passenger and other, with the Channel Islands and France. There are shipbuilding, sail-making, and rope-making establishments. Portland stone is exported from the neighboring isle of Portland (q.v.). Both Weymouth and Melcombe-Regis, particularly the latter, from the beauty of the bay and its smooth, firm sands, attract numerous visitors. There is a fine esplanade about one mile in length. Pop. (1901) 19,831.

WEYMOUTH, Mass.: town in Norfolk co.; on Boston Harbor, and on the New York, New Haven & Hartford Railroad; 12 m. s.e. of Boston. Electric lines connect the town with Boston and the near-by towns. Weymouth contains seven villages, each one having a post-office. It has manufactories for boots and shoes, hammocks, fireworks, and machinery. It has car-repair shops and extensive wool-scouring yards. The educational institutions are grammar and primary schools, private schools, Tufts Library, which contains about 20,000 volumes, the Fogg Library, and a high school at Weymouth Centre. The town owns and operates the water-works.

The first permanent settlement was made in 1623 by Capt. Robert Georges, but the place had been visited often before this time, notably in 1622 by Thomas Weston. The place was first called by the Indian name Wessagusset, until it was incorporated 1635, Sept. 2, when the present name was adopted. Pop. (1910) 12,895.

WEYR, *vīr*, Rudolf: Austrian sculptor: b. Vienna 1847, Mar. 22. A pupil of Bauer and Cesar at the Vienna Academy, he won the Reichel prize with his *Samson and Delilah* (1870), and in 1878 was commissioned to execute the decorations of the Grillparzer monument. His reliefs and experiments in polychrome sculpture won for him a considerable reputation. Besides numerous decorations for the university and museum buildings at Vienna, his works include the *Triumphal Procession of Bacchus and Ariadne* for the

pediment of the Burgtheater, and the great fountain before the Imperial palace.

WHACK, n. *hwăk* [a corruption of *thwack*]: a blow; in *slang,* a large slice: V. to strike. WHACK'ING, imp. ADJ. large; stout; thumping; big. WHACKED, pp. *hwăkt.* WHACK'ER, n. *-ėr, familiarly,* a tremendous falsehood; a whopper.

WHALE, n. *hwāl* [AS. *hwæl;* Icel. *hvalr;* Dan. and Sw. *hval;* Ger. *wallfisch,* a whale]: the largest of sea-animals, frequenting high latitudes, and sought for on account of its oil and other commercial products; a large cetacean (see below). WHALING, n. *hwāl'ing,* the business of catching whales: ADJ. pertaining to the catching of whales. WHAL'ER, n. *-ėr,* a ship or person employed in the whale-fishery; a long narrow boat used when pursuing and harpooning the whale. WHALEBONE, an elastic horny substance obtained from the upper jaw of the whale (see below). WHALE'S BONE, used for ivory in Shakespeare. WHALE-FIN, n. whalebone.

WHALE: any large cetacean is called a whale, while any small representative of the order is usually called a porpoise or dolphin. This division of the group is unscientific, however, and breaks down when the moderate-sized forms are in question, the layman being always in doubt whether these are to be classified as whales or as porpoises.

It happens that all cetaceans having whalebone, instead of teeth, or those constituting the suborder *Mystacoceti,* are of large or huge size. These may be all quite properly called whales, but it will be necessary for the present purpose to add to this natural group the sperm whale, a representative of the toothed whales, or suborder *Odontoceti* and the bottlenosed, or ziphioid, whales, which constitute the family *Ziphiidæ,* and also belong among the toothed whales. The order then stands as follows:

Order *Cetacea.* Cetaceans.
  Suborder *Mystacoceti.* All cetaceans with whalebone.
    Family *Balænidæ.* (Co-extensive with the suborder.)
  Suborder *Odontoceti.* All cetaceans with teeth.
    Family *Physeteridæ.* Sperm whales.
    Family *Ziphiidæ.* Bottlenosed whales.
    Family *Delphinidæ.* Porpoises or dolphins.
    Family *Platanistidæ.* River dolphins.

Whalebone Whales.—Whalers recognize several species or groups of whales with whalebone, to which they give the names of right whales, humpbacks, finbacks and sulphurbottoms. These correspond to natural groups of genera, except that the sulphurbottom is really a kind of finback. To these are to be added the California gray whale, or grayback, a very distinct genus, combining characters of right whales and finbacks, and the pygmy

right whale of New Zealand. These various genera may be distinguished by the following external characters:

Humpbacks (genus *Megaptera*).—Form bulky and uncouth. Head broad and rounded in front, and flat on top, with rows of hemispherical tubercles. Belly with many broad longitudinal ridges and furrows. Pectoral fins very long (about one-third the length of the body), with serrations corresponding to the joints of the index finger. A low, thick dorsal fin. Flukes with a serrated margin. Color black and white. Whalebone short, dull blackish.

Finbacks (genus *Balænoptera*).—Form slender and graceful. Head broad and flattish, more or less pointed in front. Belly with very numerous narrow ridges and furrows. Pectoral fins short, with plain margins. A falcate dorsal fin. Color gray and white. Whalebone short, striped gray and white, or entirely black, or black with white bristles, or entirely white.

California Gray Whale (genus *Rhacianectes*).—Form rather slender. Head comparatively narrow, moderately arched and pointed. No abdominal ridges or furrows, but two short furrows on the throat. No dorsal fin. Pectorals short. Color mottled gray. Whalebone short, white.

Right Whales (genus *Balæna*).—Form heavy and compact. Snout very narrow, and strongly arched. No ridges or furrows. No dorsal fin. Pectorals short and very broad. Color entirely black, or with a little white below. Whalebone very long, narrow, black.

Pygmy Right Whale of New Zealand (genus *Neobalæna*).—Similar to *Balæna*, but size small. A dorsal fin present. Whalebone white.

Humpbacks.—The humpback is in many respects the most remarkable of all whales. It reaches a length of about 50 feet. The anterior part of the body is very massive, but the posterior quite slender and at the same time so irregularly shaped and so awkwardly joined to the thorax that the animal appears misshapen. This effect is heightened by the dorsal fin, which is low and thick, with a concave anterior margin, and rounded tip. Not less striking are the immense crenate-margined pectoral fins, like the wings of a bird, and about one-third as long as the body. The broad abdominal ridges nearest the median line join below on the throat, forming a chin-like protuberance. Humpbacks are infested by large barnacles of the genus *Coronula*, which fasten on the head, fins, flukes and abdominal ridges. Where they settle on the black skin but are afterward rubbed off, or otherwise got rid of, they leave behind distinct white marks, in the form of disks, circles, crescents, etc., which add to the singular appearance of these whales. Fastened to the large barnacles, are often bunches of stalked barnacles, genus *Otion*, which hang down like fringes on the fins. Some nine or ten species of hump-

backs have been described, but wherever observed they present characters so nearly alike that it is extremely probable that all belong to one widely-diffused species. The species of the Atlantic coast of North America and Europe is *Megaptera nodosa*. Humpbacks occur in all seas, from the Arctic to the Antarctic. They congregate in bands, or schools, which sometimes number hundreds or even thousands of individuals. They are very irregular in their movements and indulge in all manner of uncouth actions. When they dive or sound they throw the flukes out of the water. Like other cetaceans they engage in seasonal migrations northward and southward. In the North Atlantic they withdraw from the waters of Greenland, Newfoundland, Iceland, and Norway in fall and return in spring. They feed chiefly on fish.

Sulphurbottom, or Blue Whale (*Balænoptera musculus*).—The sulphurbottom, as already stated, is a species of finback. Wherever finbacks are observed there are found to be four distinct forms. Each of these has been described from different localities under different names, but the variations are slight in each case, and have never been fully established, so that there is a strong probability that there are but four cosmopolitan species. These are the sulphurbottom, the common finback, the pollack whale, and the little piked whale. Each form will now be considered separately, beginning with the sulphurbottom. The sulphurbottom is the largest of whales and the largest of all animals now existing, and was probably not surpassed in size by any animal living in earlier geological times. The largest individual of which there are authentic measurements was 88½ ft. long. The average length for adults is about 76 feet. The sulphurbottom has a massive head and broad snout, and the body tapers gradually to the flukes. The dorsal fin is falcate and less than a foot high, and is situated at a point a little more than three-fourths the distance from the tip of the snout to the notch of the flukes. The pectoral fins are falcate and about 7½ ft. long, from the axilla. In color the sulphurbottom is gray, nearly uniform on the head, but mottled on the back and sides. On the belly are numerous white spots. The pectoral fins are gray above and white below, the flukes gray on both sides, and the dorsal fin also gray, sometimes with a whitish centre. The abdominal ridges number 62 to 88. The whalebone is about three ft. long, broad at the base, and black in color, both plates and bristles. These huge whales feed exclusively on small crustaceans, the species in the North Atlantic being the thysanopod *Euphausia inermis*. The sulphurbottoms congregate in the bays of southern Newfoundland, Iceland, and northern Norway in early spring and remain until about July. Some individuals, however, appear to remain throughout the year, and their migrations are irregular and not well understood. They rarely strand

on the e. coast of the United States, nearly all the individuals reported as such belonging to the next species, the common finback.

Common Finback (*Balænoptera physalus*).—This is the most commonly observed and best known of the finbacks. In size it ranks next to the sulphurbottom. The form is exceedingly attenuated. Adult individuals reach an average length of 65 ft. The head is narrow anteriorly. The dorsal fin exceeds a foot in height and is situated as in the sulphurbottom. The pectoral fins are small, somewhat triangular, and about 5 ft. long, from the axilla. This whale is gray on the back and upper surfaces of the pectoral fins and flukes, and white on the belly and the under surfaces of the pectoral fins and flukes. The whalebone as a whole is gray, striped longitudinally with white, but at the anterior end of the jaw on the right side the whalebone is all white. The outside of the right lower jaw is also white. These parts are dark on the left side. This singular asymmetry of coloration is peculiar to, and characteristic of, the species. The common finback feeds on various kinds of small fish, especially the capelin, herring, young cod, etc.

In the North Atlantic it appears in spring in Massachusetts Bay, the Gulf of Maine, about Newfoundland, and in Greenland waters, as well as on the coasts of northern Europe. In the fall it withdraws from these waters and is supposed to migrate southward. The large whales which strand on the east coast of the United States are almost invariably of this species. When swimming or rising to spout, this whale, like the sulphurbottom, shows the top of the head and back and the dorsal fin, but nothing beyond. The flukes are not thrown out of the water when it dives or sounds.

Pollack Whale, or Rudolphi's Rorqual (*Balænoptera borealis*).—This is a smaller whale than either of the preceding, adults reaching a length of about 45 ft. The form is more compact, the dorsal fin larger and more anteriorly placed. It is black on the back and sides, with a restricted gray or whitish area on the belly. The pectoral fins and flukes are dark gray, both above and below. The whalebone plates are black, but the bristles white. This whale, like the sulphurbottom, feeds on small crustaceans. Although large numbers of individuals were taken on the northern coast of Norway in some years when the fishery was at its height, it appears to be less abundant than the larger species. It was not positively known to occur on the east coast of North America until 1903, when four specimens were taken at the Newfoundland whaling stations. It cannot yet be considered more than a straggler in American waters. A similar, or identical, species has been observed in the Pacific Ocean, but little is known regarding it.

Little Piked Whale, or Lesser Finner (*Balænoptera acuto-rostrata*).—This is the smallest of the finbacks.

and is not sought for by whalers. The form is thickset like that of a porpoise, and the head pointed. When adult, it is about 25 ft. long, and the maximum length is about 28 ft. The dorsal fin is larger than in any of the other finbacks, and is situated farther forward, or at a point only about two-thirds the distance from the tip of the snout to the notch of the flukes. It is very dark gray or blackish on the back and sides, and white on the belly, a little clouded with gray. The pectoral fins are blackish above, with a broad cross-band of white near the middle; below they are white. The flukes are blackish above and whitish below. In this species the abdominal ridges are very numerous and narrow. The whalebone is very short and entirely white. The little piked whale feeds upon fish. It is found with the other species of finbacks in the North Atlantic, migrating northward and southward in the same manner, according to the season. A few specimens have been observed on the coast of New England, New York, and New Jersey, either stranded, or entangled in the nets of the fishermen. Whales of the same size and form, and with the same peculiar markings, have been observed on the coast of New Zealand, Argentina, Washington, Alaska, and in other widely separated localities.

California Gray Whale, Grayback or Devilfish (*Rhachianectes glaucus*).—This remarkable whale is found only in the North Pacific. Its characters have been already enumerated above. When full-grown it has a length of about 40 ft. It is a restless and sagacious animal, and when wounded frequently attacks the boats sent out for its capture. In earlier days it was found abundantly in the winter months in the lagoons and bays of Lower California, whither it repaired to breed. It is fond of playing in the surf and approaches close inshore to indulge in this recreation without fear of stranding. The gray whale is found as far northward as Bering Sea, and occurs also on the coast of Japan, but has no counterpart in other seas.

Greenland Right Whale, Arctic Right Whale, or Bowhead (*Balæna mysticetus*).—In reviewing the observations of earlier zoologists, Cuvier came to the conclusion that but one species of right whale existed in the North Atlantic and Arctic oceans, an erroneous opinion, which nevertheless was accepted until the Danish cetologist Eschricht proved that the right whale of the Arctic was quite distinct from the species occurring farther south. This Arctic right whale, or bowhead, as it is called by American whalers, is most remarkable in appearance. The snout is narrow and arched like a bow. From the roof of the mouth depends the extraordinary, narrow black whalebone, which may be 12 ft. long or even longer. This whalebone is enclosed and protected by the immense oblong lower lip, the curved upper edge of which fits against the side of the upper jaw when the

mouth is shut. The back is without a fin, while the pectorals are short and broad. There are no ridges or furrows on the belly. Adults reach a length of about 60 ft. The bowhead rarely or never leaves the Arctic ice, but like other whales it migrates northward and southward with the changes of the seasons. On the e. coast of America it is never seen as far south as the s. extremity of Greenland, though there is a tradition that at the time of the discovery of the country it ranged as far south as the Strait of Belle Isle in winter. It occurs in the Arctic Ocean n. of Alaska and ranges southward into Bering Sea. Individuals are believed to pass back and forth through the channels between the islands n. of the continent from the eastern to the western side. The bowhead feeds chiefly on small pteropod mollusks and crustaceans which occur in vast multitudes in the Arctic Ocean. It is the most valuable of whales from a commercial point of view, on account of the thickness of the blubber and the length and fine quality of the whalebone, which at present commands exceedingly high prices. Its constant pursuit for three centuries has now very greatly diminished its abundance.

Atlantic Right Whale, or Black Whale (*Balæna glacialis*).—This whale resembles the bowhead in general appearance, but the head is smaller and less arched, and the whalebone shorter, or only about 7 ft. long. Near the end of the snout is a low rounded protuberance, called the 'bonnet' by whalers. This bonnet is covered with barnacles, which are not found adhering to the bowhead. The black whale, as its name implies, is usually entirely black, but some individuals have been reported as whitish or grayish on the throat and breast. When full-grown it reaches a length of about 50 ft. Like the bowhead it feeds upon crustaceans and pteropod mollusks. The species has been nearly exterminated, but in former days it appeared regularly in the bay of Biscay in winter and migrated northward to Iceland and northern Norway in spring. On the North American coast it ranges, or did range, as far s. as Georgia in winter and toward the close of that season, or in early spring, appeared in Delaware Bay and off the coast of Long Island and Massachusetts, and later in the Gulf of Saint Lawrence. A few individuals still appear quite regularly off Long Island.

There is every reason to believe that this whale was the object of pursuit of the earliest whale fishers among the Basques in the Bay of Biscay in the Middle Ages. It was the species on which the American Colonial shore whale-fishery was based. So persistently was it pursued, however, that for many years it was supposed to be extinct and no remains which could be identified with it were to be found in any museum. Within the last 25 years, a few individuals have appeared every spring off the e. coast of the United States, and a few have been

captured, or have stranded, on the coasts of southern Europe and Iceland. As the right whale does not occur within the tropics, it has been questioned whether the large species observed about New Zealand, in the North Pacific and in other waters is the same as that of the North Atlantic. Opinion is at present divided on the subject, but it is generally conceded that the real differences between the right whales of the northern and southern temperate seas, if any, have yet to be pointed out. The Atlantic right whale, like the bowhead, feeds upon pteropod mollusks and crustaceans.

Pygmy Right Whale of New Zealand (*Neobalæna marginata*).—This is a remarkable little whale, resembling the large right whales, but reaching a length of only about 20 ft. It has a small dorsal fin, but no abdominal ridges or furrows. The whalebone is long and white. In color the whale is black, with a line of white along the belly. It has many osteological peculiarities, among which one of the most striking is the flatness and breadth of the ribs, of which there are 17 pairs. The lumbar vertebræ are only two in number. Little is known of the habits of this whale.

Sperm Whale (*Physeter macrocephalus*).—This whale, as already stated, belongs to the *Odontoceti*, or toothed whales, one of the two main divisions of the order Cetacea, which includes also the porpoises, river-dolphins, and bottlenosed or beaked whales. But one species of sperm whale is known. When full-grown the male reaches a length of 60 or 65 ft., but the female is much smaller. The head is of immense size, and is shaped like an elongated wedge with the base uppermost, and the edges and free end rounded. The blowhole is single and situated at the end of the snout on the left side. The lower jaw is very narrow and much shorter than the upper, and the two sides are joined together anteriorly for about one-half the length. In it are implanted about 44 large conical teeth which fit into pits in the upper jaw when the mouth is closed. There are no teeth in the upper jaw. The back is without a fin, but is raised into a number of low irregular humps posteriorly. The pectoral fins are broad and about 6 ft. long. In color the sperm whale is blackish above and somewhat mottled with gray below. It occurs in all seas except the Arctic and Antarctic, but is essentially an animal of the tropics. The herds or schools are diversified in character, some comprising only young bulls, other females and young led by an old bull, etc. At times old bulls are encountered wandering singly or in small groups. These old males are ill-tempered and pugnacious, and do not hesitate to attack the boats of the whalers. The sperm whale feeds upon large cuttlefish, which its great strength and powerful under-teeth are supposed to enable it to dislodge from their rocky retreats at the bottom of the sea.

Bottlenosed Whales, or Beaked Whales (family *Ziphiidæ*).—This family comprises four or five genera of small whales, none of them exceeding about 30 ft. in length. Several species of each genus have been described, but many of them appear to be without a certain foundation. Like the sperm whale, they belong to the suborder *Odontoceti,* or the toothed whales. They never have, however, more than four teeth regularly implanted in the jaws, but some species have numerous minute rudimentary teeth imbedded in the lips. The head of all the forms, at least in the young, is pointed, the dorsal fin low and placed far back toward the flukes, the pectoral fins narrow, and of moderate length. In the bottlenosed whale of the North Atlantic (*Hyperoodon rostratum*) the forehead gradually increases in size with age, until it is sharply marked off from the narrow beak, like the shoulder of a bottle. This species congregates in large herds and is eagerly sought by whalers for its oil. The beaked whales of the remaining genera, *Mesoplodon, Berardius,* and *Ziphius,* are far less abundant. They travel in pairs. *Hyperoodon* is peculiar to the North Atlantic, *Berardius* occurs only in Bering Sea and about New Zealand, while *Mesoplodon* and *Ziphius* appear to be cosmopolitan genera. The beaked whales subsist upon cuttlefish.

Spermaceti.—Spermaceti is the solid constituent of the crude oil of the sperm whale and some other cetaceans. The head of the sperm whale, between the skull and the integuments, is a kind of large reservoir of a semi-solid 'head-matter' rich in spermaceti, but the substance is also contained in the oil of other parts of the body and especially the dorsal humps. To extract the spermaceti, the oil is boiled, chilled and afterward submitted to a heavy pressure. The crude brown spermaceti is refined by heating and bleaching with alkali. Spermaceti is a whitish, translucent substance, a little lighter than water, and soluble in chloroform, ether and carbon bisulphid. It melts at about 125° F. Though an excellent substance, for candles, it has been very largely supplanted for that purpose by paraffin and other low-priced materials. The production in the United States in 1901 amounted to 400,000 pounds, valued at $100,000.

Whale Oil.—The use of whale oil appears to be of ancient origin. It was doubtless first obtained from whales accidentally stranded on the shores, a more frequent occurrence during the early abundance of the cetaceans than at present, when their numbers have been so greatly reduced by excessive fisheries. As the demand for the oil increased beyond the supply available from stranded whales, individuals sighted from the shore were attacked and beached. Owing to the frailty of the boats and equipment, this was a more daring attempt than might be supposed. Just prior to the Revolutionary War there were 183 American vessels in the right-whale

fishery of the North Atlantic waters, and 125 were engaged in cruising for sperm whales from Newfoundland to the coast of Brazil. The Revolutionary War and the War of 1812 interfered with the fisheries; but during the period of peace following 1815 they increased greatly in extent until 1846, when the fleet numbered 678 ships and barks, 35 brigs, and 22 schooners, a total of 735 vessels, with an aggregate tonnage of 233,189 tons, and a value of $21,075,000, exclusive of outfits and supplies. The entire capital invested in the fishery and its associated industries at that time approximated $40,000,000, and 40,000 persons derived from it their chief support. During the same year the whaling fleet of all Europe numbered but 230 vessels. The crude value of the American catch from 1840 to 1860 averaged about $8,000,000 annually. The greatest value was in 1854, when 2,315,924 gallons of sperm oil worth $1.48¾ per gallon, 10,074,866 gallons of whale oil worth 59⅝ cents per gallon, and 3,445,200 pounds of whalebone worth 39½ cents per lb. were secured, the total value being $10,802,594. In the preceding year, 1853, the total product was 3,246,925 gallons of sperm oil, 8,193,591 gallons of whale oil, and 5,652,300 lbs. of whalebone, the whole valued at $10,766,521. Sperm oil and whale oil then served nearly all the diversified uses for which oil was required, the chief exception being leather-dressing, for which neatsfoot and cod oils were largely employed. The principal uses were as illuminant, lubricator, in cordage manufacture, screw-cutting, and steel-tempering. The streets of the principal cities were lighted with the oil, and theatres and public buildings were lighted with gas made from the foots.

In 1902 the whaling fleet of the United States consisted of 8 steamers, 18 barks and brigs, and 12 schooners, aggregating 8,366 tons. Of these, 11 barks and 10 schooners were sperm-whale fishing in the Atlantic Ocean, 8 steamers in the Arctic, 6 barks in Okhotsk Sea and off the coast of Japan, 2 schooners in Hudson Bay, and 1 brig at Desolation Island. The total whale-oil product of the world at present approximates 3,000,000 gallons yearly, of which 750,000 gallons are produced by the United States fisheries, 900,000 by those of Norway, and the remainder by Scotland, Russia, Japan, Newfoundland, etc.

Whaling, or the pursuit of whales as an industry, originated in Europe at a remote period. There are obscure references to it among the Norwegians and English as early as the beginning of the 10th century. As early as the 11th century the Basques pursued the North Atlantic right whale, or black whale, (*Balæna glacialis*), with harpoons, in open boats. It is even asserted that they crossed the Atlantic in pursuit of their quarry before the time of Columbus, but this has not been substantiated. Certain it is, however, that they visited New-

foundland immediately after the discovery of America and captured the same species of right whale in those waters. They are supposed also to have first seen the Arctic right whale, or bowhead (*Balæna mysticetus*), in the Strait of Belle Isle. In 1607 Henry Hudson encountered the bowhead in the vicinity of Spitzbergen. The Spitzbergen fishery developed rapidly on account of the large amount of oil yielded by this species, and was extensively engaged in by various European nations, especially the Dutch, who in 1680 employed 260 vessels and about 14,000 men in the industry. During the decade beginning 1679, the Dutch took an average of about 1,000 whales annually. As the bowheads decreased about Spitzbergen, they were sought for to the westward, and in 1719 a Dutch vessel first entered Davis Strait. This fishery was developed chiefly by the British, Danes, and Americans. In 1789 there were 255 British vessels engaged in it. The first American vessel visited Davis Strait in 1732. The number increased rapidly and at the height of the fishery, just before the Revolutionary War, Massachusetts alone sent 183 vessels to the strait.

About 1670, the American colonists succeeded in establishing a boat shore-fishery for the Atlantic right whale, which in those days was abundant on the coast, especially off Long Island and in Delaware Bay, and was well known from a much earlier date through stranded individuals. Later the colonists pursued it in sailing vessels farther from shore and in the Gulf of Saint Lawrence, but finally turned their attention to the Arctic right whale, or bowhead, in Davis Strait, as already mentioned.

About 1712 the first sperm whale was captured at sea by a Nantucket whaler. This fishery rapidly rose in importance and was pursued in all quarters of the globe, especially by the Americans. The British did not apply themselves to it until 1775, but in 1790 a British whaling vessel rounded Cape Horn and opened up the Pacific fishery, which immediately grew to enormous proportions, and was at its height in 1837. The American whaling fleet in 1839 comprised 555 vessels, of which the majority were engaged in the Pacific sperm-whale fishery. In 1847 the number rose to 594, while the foreign whaling fleet numbered 230 vessels. The size of the American fleet reached its maximum in 1846, when 729 vessels were employed.

While a large part of the American fleet was engaged in the pursuit of the sperm whale, the remaining vessels were chiefly employed in hunting right whales, especially in the North Pacific. As the sperm-whale fishery declined, this branch increased in importance. In 1835 the famous Kadiak ground was discovered. A new epoch opened in 1843 when bowhead whales were first taken off the Kamchatka coast. In 1848 the first vessel

passed through Bering Strait to pursue these large whales in the Arctic Ocean. The fishery in the North Pacific and adjoining Arctic was at its height in 1852, when 278 vessels were employed. In 1866 the first American steam whaling-vessel was brought into use, and in 1880 two steamers were added to the Pacific-Arctic fleet.

The introduction of mineral oils for illuminating and other purposes, and the decrease in the abundance of whales, gradually broke down the fishery for right and sperm whales and at the present time the number of vessels engaged in the industry is but a handful compared with the fleets of former days. A few sailing vessels still pursue the sperm whale, but in 1902 only five British vessels (steamers from Dundee, Scotland), entered Davis Strait in pursuit of the bowhead. The American whaling fleet in 1902 comprised 38 vessels, including eight steamers engaged in the Pacific-Arctic bowhead fishery. Of the remaining 30 sailing vessels, 21 engaged in sperm whaling in the Atlantic, 6 visited Okhotsk Sea and the coast of Japan, two entered Hudson Bay, and one remained about Desolation Island. Whale-oil has greatly declined in value, but the whalebone of the bowhead, which in earlier days was worth only a few shillings a pound, now brings from $5 to $7 a pound. As a single bowhead yields 2,000 pounds or more, the profit from even a single whale is large.

The humpback whale was always pursued to some extent by right-whale whalers, but the finbacks and sulphurbottoms, besides furnishing a relatively small amount of oil, were too swift to be attacked successfully with hand-harpoons. About 1865, however, Svend Foyn, a Norwegian fisherman, invented a method of shooting them with a combined harpoon and bomb fired from a swivel gun mounted at the bow of a small steamer, and for 30 years large numbers of sulphurbottoms, finbacks, and humpbacks were killed annually at stations established on the coast of Finmark. Later the same method was employed at Iceland, The Faröe and Shetland Islands, and also about Japan. In 1898 this mode of whaling was introduced into Newfoundland, where several hundred sulphurbottoms, common finbacks and humpbacks are now killed annually.

A considerable number of common finbacks and humpbacks have been killed in Massachusetts Bay and the Gulf of Maine during the last 25 years by means of explosive bombs attached to a special form of hand-harpoon, called a 'darting gun.' A boat-fishery of limited extent has been in existence for many years on the coast of California. It has for its object the capture of the California gray whale, and the humpback, which are killed by harpoons fired from a swivel gun mounted at the bow of a whale boat. Similar boat-fisheries exist on the coast of New Zealand, in the West Indies, and in other parts of the world.

WHALEBACK VESSELS: vessels having the main decks covered in and rounded over, the hull thus presenting a form roughly resembling the back of a whale; for use in rough water, the waves passing completely over them without resistance or injury. Sometimes they have upper works. The first craft of this kind was built for a Baltimore company about 1860, with a view of shortening the transatlantic passage, but it proved a complete failure. Another was built in 1878, to convey to America the Egyptian obelisk known as Cleopatra's Needle; it had no motive-power, but was towed by a steamer. It was abandoned during a heavy gale in the Bay of Biscay, but remained afloat seaworthily, and was eventually brought to port with the obelisk uninjured. In 1888 Alexander McDougall, shipmaster of Duluth, Minn., built a barge of 437 tons registry and 1,400 tons capacity. Its cost was $45,000, yet it is stated that within two years she netted her owners nearly twice that amount. A company, founded by McDougall, at once placed on the great lakes a fleet of whalebacks, with total capacity of 70,000 tons. Most of these were self-propelling steamers, but some were for towage only, all being of steel. Such vessels are used mainly as grain-carriers, but the *Christopher Columbus* (abt. 3,000 tons) was in satisfactory service during the Columbian Exposition in carrying passengers between Chicago and the exposition grounds. Later she plied as a passenger-steamer between Chicago and Milwaukee; average speed, nearly 20 m. per hour.

WHALE'BONE: the baleen plates which take the place of teeth in the mouths of the Baleen Whales (see WHALE). They form an important article of commerce, and vary in length from a few inches to 10 ft., and in rare instances to 12 ft. Their chemical constitution is albumen hardened by a small proportion of phosphate of lime. Whalebone is the outgrowth of horny substance from the epidermis of the upper jaw in whales of the family *Balænidæ*. It takes the form of triangular plates, which differ greatly in size, proportions and color in different species. Plates to the number of 200 or 300 are attached by their bases transversely to the roof of the mouth on each side. They are longest in the middle of the series and at the ends become mere bundles of fibres. The plates are smooth and straight on the outer edge, but the inner edge is fringed with coarse bristles. The bristles of adjoining plates become matted together, forming a strainer by which the whale is enabled to retain in its mouth the fish or small crustaceans, etc., on which it feeds, while the water is squeezed out through the plates by the action of the tongue. In the right whales, the humpback and the sulphurbottom, the whalebone is black or blackish; in the common finback striped gray and white; in the pollack whale, black with white bristles; and in the little piked whale, the California

gray whale and the pygmy right whale of New Zealand, yellowish-white. The most valuable whalebone commercially is that of the right whales, and especially that of the bowhead, which may have a length of from 10 to 12 or even 15 ft., and is very flexible. A single bowhead yields 2,000 pounds of whalebone, valued at from $5 to $7 a pound.

Whalebone from the humpback, sulphurbottom and finback is short, coarse and brittle, but also enters into commerce. Whalebone is used in the manufacture of corsets, in stiffening and adding gloss to certain kinds of cloth, for surgical instruments, whips, etc.

WHALE-LOUSE: any small parasite infesting the whale; specifically a crustacean of the genus *Cyamus*, order *Læmodipoda*, having the body short and rather broad; the legs short and stout; seven pairs of legs; the 1st pair more slender than the rest; the 1st, 2d, 5th, 6th, and 7th pairs furnished with sharp hooked claws, the 3d and 4th terminating not in claws, but in a long, almost cylindrical joint. All the species of *Cyamus* are parasitic on Cetacea, attaching themselves to the skin by their claws. Whales are sometimes so completely covered with them as to appear of whitish color even at a distance; and when the whale is captured, its skin is found to be deprived of the epidermis. *Cyamus Ceti* is said to infest also the mackerel and other fishes of the family *Scomberidæ*.

WHALLEY, *hwŏl'lĭ*, Edward: English regicide: about 1620—about 1678; b. England. At the beginning of the revolution of 1642 he was a merchant. He joined the parliamentary party, though his family were royalists, and entered its army. For bravery at Naseby 1645, parliament made him a colonel. He was in command of the horse at Bristol, Banbury, and other places, and was intrusted with the charge of the king's person at Hampton Court. At Dunbar, with Gen. George Monk, he commanded the infantry. Whalley was a member of the high court of justice that tried King Charles I., and signed his death-warrant; a member of Cromwell's 2d and 3rd parliaments, and later sat in his house of lords. As maj.-gen., he governed five counties in England. At the restoration, with his son-in-law, William Goffe, he fled to this country, and after 1664 lived at Hadley, Mass., where he died.

WHAME, n. *hwām:* the horse-fly; the gad-fly or cleg; an insect of the family *Tabanidæ* (q.v.).

WHANG, n. *hwăng* [AS. *thwang*, a leather string: a form of *thong*]: a strap or strip of leather; in *Scot.* and *prov. Eng.*, a large piece, as a *whang* of cheese: V. in *prov. Eng.*, to beat.

WHANGEE': see Wanghee.

WHANG-HAI, or Hwang-Hai, *hwâng-hī'*, or Yellow Sea (sometimes spelled Hoang-Hai, *hwâng-hī'*): that

portion of the Pacific Ocean which washes the n. part of the e. coast of China; bounded w. by the provinces of Shangtung and Keang-su, e. by the peninsula of the Corea and by Japan. It terminates on the n.w. in the Gulfs of Pe-chih-li and Leao-tong, and opens out in the s.e. into the Tung-hai or Eastern Sea. It is more than 600 m. long, and over 400 m. in average breadth. The Whang-Hai is shallow, and near the land its waters are of a lemon color, owing to the nature of the bottom, which is often furrowed by vessels navigating it. It is fast becoming more and more shallow, owing to the quantity of alluvium borne down into it by the rivers Hwang-ho and Yang-tse.

WHAP, or WHOP, v. *hwŏp* [W. *chwap,* a sudden stroke]: to beat; to flutter; to strike; N. a blow. WHAPPER, or WHOPPER, n. *hwŏp'pĕr,* in *slang,* a monstrous or barefaced lie. WHAP'PING, or WHOPPING, a. *-pĭng,* inordinately large.

WHARF, n. *hwawrf* [AS. *hwerf,* a dam erected to keep out water—from *hweorfan,* to turn about: Dut. *werf;* Dan. *wærft,* a wharf]: a bank or platform of stone, wood, or metal, formed on the shore of a harbor, river, or canal, for convenience of lading and unlading ships; a quay; a pier; in *OE.,* a bank or shore. WHARFS, *hwawrfs,* or WHARVES, *hwawrvz,* n. plu. WHARF'AGE, n. *-āj,* the dues paid for the use of a wharf. WHARF'ING, n. wharfs in general. WHARFINGER, n. *-ĭn-jĕr,* one who has the charge of a wharf; the proprietor of a wharf. A wharfinger is by law responsible in much the same way and to the same extent as a Warehouseman (q.v.). He is required to take ordinary care of the goods intrusted to him, but is not, like an inn-keeper or carrier, an insurer. His responsibility begins when the goods are placed in his custody, and ends when he ceases to have such custody.

WHARF, in Law: an erection extending out from a shore, or parallel to but connected with it, for convenience in embarking and disembarking goods, passengers, etc., from vessels. In the absence of legislation on the subject by the general government, the several states, as the owners (with some exceptions) of the soil of tide-waters within their respective territories, have the right to authorize and regulate erection of wharves, and to grant exclusive rights to municipal corporations, etc. In Maine and Massachusetts the shores and flats for 100 rods belong to the owner of the upland, and he may wharf out that distance, subject to the rights of the public, but cannot extend beyond that without legislative sanction. In Conn. and Penn. the owner of the upland has somewhat similar rights: in Conn. he may wharf out to the channel, subject to public rights, and in Penn. to low-water mark; but private persons who go upon or fasten their vessels to such wharves are not

considered trespassers. In navigable fresh-water rivers, the riparian proprietors, being the owners of the bed of the stream, may wharf out to the channel, but in doing so must not obstruct or interrupt navigation.—In the United Kingdom the soil of all tide-waters below high-water mark is vested in the crown as the conservator of public rights, and no wharf can be erected without the consent of the crown. Any wharf which interferes with navigation to such an extent as to be a public detriment can be maintained only by sanction of parliament.

WHARTON, Edith Jones: American novelist: b. New York 1862. She was privately educated and was married to Edward Wharton in 1885. She has since resided much abroad, and has published *The Greater Inclination* (1899); *The Touchstone* (1900); *Crucial Instances* (1901); *The Valley of Decision* (1902); and *Sanctuary* (1903), which have been greatly commended for subtle analysis and finished style: besides *The Decoration of Houses* (with O. Codman 1897), a rendering of Sudermann's *Es Lebe das Leben*, as *The Joy of Living* (1902); *The House of Mirth* (1905); *The Fruit of the Tree* (1907), and some uncollected stories, articles and verse.

WHARTON, Anne Hollingsworth: American author: b. Southampton Furnace, Pa., 1845, Dec. 15. She has written mainly though not entirely upon colonial themes and among her books are: *The Wharton Family* (1880); *Through Colonial Doorways* (1893); *Colonial Days and Dames* (1894); *A Last Century Maid* (1895); *Martha Washington: A Biography* (1897); *Heirlooms in Miniature* (1897); *Salons Colonial and Republican* (1900); *Social Life in the Early Republic* (1902); and *Italian Days and Ways* (1907).

WHARTON, *hwawr'ton*, Francis, D.D., LL.D.: author of law-books: 1820, Mar. 7—1889, Feb. 21; b. Philadelphia. After graduation at Yale 1839 he practiced law in Philadelphia 15 years. He was assistant attorney-general of Pennsylvania 1845; and professor of logic and rhetoric in Kenyon College, O., 1856-63. After ordination in the Protestant Episcopal Church 1863, he was rector in Brookline, Mass., and professor of ecclesiastics and international law in Cambridge Divinity School and Boston University. Beginning 1885, he was United States examiner of international claims, and from 1888 editor of diplomatic correspondence during the revolution. He died in Washington. His publications include treatises on *Criminal Law* (1846); the *State Trials of the U. S.* under Washington and Adams (1849); *Precedents of Indictments and Pleas* (1849); the *Law of Homicide*, also *Medical Jurisprudence* (1855); *Theism and Modern Scepticism* (1859); the *Silence of Scripture* (1867); a *Reminiscence of Gambier* (1868); the *Conflict of Laws, or Private International Law*, with historic

review (1872); the *Law of Negligence* (1874); the *Law of Agency and Agents* (1876); the *Law of Evidence in Civil Issues* (1877); the *Law of Contracts* (1882); *Commentaries on Law* (1884); and a *Digest of International Law*, 4 vols. (1886-).

WHAR'TON (PHILIP WHARTON), Duke of: 1699-1731, May 31; son of Thomas, Marquis of Wharton, eminent member of the whig party in Queen Anne's reign, and lord-lieut. of Ireland from 1708 until after the fall of the Godolphin administration 1710. Macaulay represents the marquis as licentious and corrupt; but the faults of his Irish administration were to some extent redeemed by his appointment of Addison as chief-sec. Philip (his son) succeeded to the title and fortune at the age of 16, and went abroad with a French Huguenot tutor, to be brought up according to his father's dying instructions, in strict Presbyterian principles, at Geneva. He contracted debts, spurned the restraints of his tutor, and ran away to Lyon. He visited the Pretender at Avignon, and, it is said, accepted from him the title of Duke of Northumberland. He went to Ireland, where, though he had not reached his 19th year, he was allowed to take his seat in the house of peers. He soon displayed such splendid abilities in debate, and supported the government with so much zeal, that, though still under age, he was raised (1718) to the highest rank in the English peerage. Wharton took his seat in the English house of peers 1720. His affairs became hopelessly involved by his extravagance, so that, although he had succeeded to an estate of £16,000 a year, he was soon compelled to accept a yearly allowance of £1,200 from his creditors. He set up a political paper, called the *True Briton*, 1723; and lost no occasion of speaking and writing against the ministry and the court. After 1724 he went to Rome, and appeared openly at the court of the old Pretender, from whom he accepted the order of the Garter. He now assumed the title Duke of Northumberland. In 1727 he fought for the Spaniards and against his countrymen at the siege of Gibraltar: this lost him his English title and estates, and led to his conviction under a bill of indictment for high treason. The rest of his life was passed in France and Spain, at one time squandering his precarious supplies of money in drunkenness and luxury, at another suffering the extremest poverty. He died in a miserable condition at a Bernardine convent in Catalonia. His brilliant talents and wasted life were sketched by Pope in his Moral Essays, in the lines beginning—

> Wharton, the scorn and wonder of our days.

The *Life and Writings of Philip, Late Duke of Wharton*, were published in 1732 (Lond. 2 vols. 8vo).

WHAR'TON, SAMUEL: merchant: 1732, May 3—1800, Mar.; b. Philadelphia; cousin of Thomas Wharton. He

was one of the firm of Baynton Wharton & Morgan, and was sent to England on business for his house, and had nearly completed the negotiations for it when some of his correspondence with Franklin was discovered, and he was obliged to fly from the country. He went to France, where he was soon joined by Franklin; and he returned to Philadelphia 1780. He was a member of the city councils; of the committee of safety of the revolution; a member of the Pennsylvania colonial and later of the state legislature; served in the continental congress 1782-3; and was a member of the Ohio company for forming a settlement on the Ohio river. He died in Philadelphia.

WHAR'TON, THOMAS: merchant: 1735-1778, May 22; b. Chester co., Penn.; grandson of Thomas Wharton, of Westmoreland, England, who was founder of the Wharton family in Philadelphia. When trouble between the crown and the colonies arose, he at once espoused the cause of the colonies, and was one of the first to sign the non-importation resolutions of 1765. At the closing of Boston Harbor he was chosen a member of the committee on correspondence, was a deputy to the convention called by the citizens of Philadelphia to meet 1774, July 15, and one of the committee of safety of the revolution. In 1776, July 24, he was made president of the council of safety, in which the executive authority was temporarily placed. In 1777 he was elected president of Pennsylvania, with the title 'His excellency Thomas Wharton, junior, esquire, president of the supreme executive council of Pennsylvania, captain-general, and commander-in-chief in and over the same.' He held the office until his death. On the British occupation of Philadelphia, he with the executive council removed to Lancaster, where he died and was buried.

WHARTON, THOMAS: American journalist: b. Philadelphia, Pa., 1859, Aug. 1.; d. there 1896, Apr. 6. He graduated from the University of Pennsylvania in 1879, joined the editorial staff of the Philadelphia *Times* in 1888 and published *A Latter-Day Saint* (1884); *Hannibal of New York* (1886). His short story *Bobbo* enjoyed wide popularity.

WHAT, interrog. and compound rel. pron., sometimes used adjectively, *hwŏt* [AS. *hwæt*, which, what, neut. of *hwá*, who (see also WHO)]: as a relative pronoun *what* is equal to that which; the thing that; the sort or kind of thing, as, I will stand by *what* I have said—i.e., by *that which* I have said. It refers to singular and neuter antecedents, and is used both substantively and adjectively. *What* was formerly and still is vulgarly used for *that* or *which*, as, if I had a donkey *what* wouldn't go (for examples see Shak., *Hen. VI.*, vi. 1, and *T. of A.*, iv. 2). As an interrogative *what* inquiries as to the name, nature, quality, state, etc., of things, as, *what* have you done? *what* is the matter?—i.e., state the name, nature, or par-

ticular kind of thing you have done, etc. As applied to persons, it is sometimes equal to *who*, as, *what* is this man? Though originally the neuter of 'who,' what is now used adjectively without respect to gender. *What* is used also as an exclamatory word by way of surprise or question, meaning, how great, how remarkable, and the like, as, *what* beauty! *what* grandeur! It is also used for *partly* or *in part*, as, *what* with war, *what* with poverty; indicating something indefinite in the mind of the speaker, as, I tell thee *what*, I know not *what*. WHAT NOT, an indefinite enumerative phrase nearly equal to 'what you will'; some other thing or things (whether similar or dissimilar); various other things; et cetera, implying variety and miscellaneousness; 'that sort of thing,' as, 'some dead puppy, or log, or *what not*.' WHAT-NOT, n. a piece of furniture with shelves for receiving miscellaneous articles of use or ornament. WHAT IF, what will it matter if. WHAT THOUGH, what matters it though; even granting that; allowing that. WHATEV'ER, rel. *-ĕv'ĕr*, or WHAT'SOEV'ER, *-sō-ĕv'ĕr*, anything soever which; the whole that. WHAT DAY, on the day when. WHAT TIME, at the time when.

WHAT CHEER, Iowa: city in Keokuk co.; on Coal creek, and on the Chicago and Northwestern, and the Burlington, Cedar Rapids and Northern railroads; about 70 m. s.e. of Des Moines. It is in an agricultural and coal mining region, and has several industries connected with farm and dairy products. It has six churches. The two banks have a combined capital of $80,000. Pop. 2,870.

WHAT-CHEER: in Rhode Island, a watchword or shibboleth, derived from the fact that the Indians of the colony thus greeted Roger Williams and his companions when they first landed on the Sekonk river near the present site of Providence.

WHATCOM, Wash.: city, county-seat of Whatcom co.; on Bellingham Bay, and on the Great Northern, the Northern Pacific, and the Bellingham Bay and British Columbia railroads; about 79 m. n. of Seattle. It has an excellent harbor, and steamer communications with the Puget Sound and the Pacific ports. A state road extends over the Cascade Mountains, across the Mount Baker Pass, to the gold and silver mines and to the grazing lands on the Columbia river. Four miles from the city is the Cornwall coal mine. The water-supply (gravity system) is obtained from Lake Whatcom, 4 m. distant. The city has a good sewerage system, electric-light plant, and electric railway. The court-house, city hall, schools, and churches are the principal buildings. It has the State Normal School, a high school, graded elementary schools, and a library. In December, 1890, the old city of Whatcom and the town of Sehome were consolidated and called New Whatcom. In 1901 the name was changed to Whatcom. Pop. 4,900.

WHATELY, *hwăt'lĭ*, RICHARD, Archbishop of Dublin 1787, Feb. 1—1863, Oct. 8; b. in Cavendish Square, London; fourth son of Joseph W., D.D., of Nonsuch Park, Surrey, prebendary of Bristol, vicar of Widford, and lecturer at Gresham College. He was sent in due time to a private school at Bristol, and 1805 passed to Oriel College, Oxford. He took his bachelor's degree 1808, taking a second class both in classics and in mathematics. He got the English-essay prize 1810. In 1811 he was elected a fellow of Oriel College, among whose fellows were Arnold, Keble, Pusey, and the elder Newman. About 1815 he wrote (originally for the *Encyclopædia Metropolitana*) what he afterward expanded into his popular treatises on Logic and Rhetoric. In 1821, the year of his marriage, he published two works—a volume of sermons on *The Christian's Duty with respect to the Established Government and the Laws;* and his celebrated and characteristic essay, *Historic Doubts relative to Napoleon Bonaparte*, whose object was to ridicule the criticism to which the Gospel narratives were subjected by skeptical writers, by applying the same kind of criticism to events within the memory of all the world, and starting doubts as to whether these events had occurred. This *jeu d'esprit* with a purpose created a great sensation, and has been translated into several foreign languages. In 1822 W. was presented to the living of Halesworth, in Suffolk. In the same year he delivered the Bampton lectures at Oxford, on *Use and Abuse of Party Feeling in Religion.* In 1825 he was appointed by Lord Grenville principal of St. Alban's Hall, which, under his energetic rule, quickly lost the bad character which it had long sustained in the university. In 1829 he was appointed prof. of political economy. In 1831, Lord Grey's govt., at the instance of Lord Brougham, appointed him abp. of Dublin and bp. of Glendallach: his episcopal charge was enlarged 1846 by the addition of the bishopric of Kildare.

During the ten years preceding his appointment to the archbishopric, W. had incessantly been writing and publishing, chiefly on theological and ecclesiastical subjects. He belonged to the liberal school in religion and in politics; he was opposed to high-church or 'Catholic' views in theology, and to toryism in politics. Though his Christianity was genuine, his keen and independent intellectual development of it caused the strictly evangelical party, equally with the high-church party, to distrust him: both noted that their party traditions were not accepted by him as authority. He had taken a keen interest in political questions, and had made himself conspicuous at Oxford by advocacy of Rom. Cath. emancipation, of which the party in the church which had most sympathy with the theology and ecclesiastical system of the Roman Church were the most determined opponents. When Sir R. Peel, after his change of views on the emancipation question, voluntarily submitted himself for re-election to the univ., W., though a liberal, came forward to support him. His *Essays on Some of the Peculiarities of the Christian Religion* appeared 1825; *Elements of Logic*, 1826; *Elements of Rhetoric*, 1828; *Essays*

on Some of the Difficulties in the Writings of St. Paul, etc., 1828; *Thoughts on the Sabbath*, 1830; *Errors of Romanism traced to their Origin in Human Nature*, 1830. His *Introductory Lectures on Political Economy* were pub. 1831. By this time, his writings, and his immense industry and ability in his various public functions, had placed him among the foremost men of the univ., and had given him rank among the most remarkable thinkers and writers of his time. Though many distrusted him as a liberal, questioned the soundness of parts of his theology, or thought his manners too eccentric, and his habit of mind too peculiar, for one who was to rule over others, there could be no question that his abilities and reputation were equal to the high position to which he was called.

As abp. of Dublin, W. was very active in all matters of importance, social and ecclesiastical, and showed deep interest in every question affecting the welfare of Ireland. He was one of the original members of the board of national education, and continued a member till 1853, when he retired, in consequence of a departure, as he thought, having been made from the principles of unsectarian religious instruction for Rom. Catholics and Protestants alike, on which, till that time, the national education had been carried on. He was perhaps the most active member of the board, and the success of the national system was due largely to him. He and members of his family were always foremost in supporting well-devised charitable schemes. His beneficence was, in fact, unbounded; though an opposite impression prevailed among those who did not know him, because he wrote and spoke strongly against casual benevolence, and used to say he had never given a penny to a beggar. He gave great sums in charity, often without the knowledge of his nearest friends; and he and his family gave unwearied labors to alleviate the miseries of the people in the terrible famine years. As archbishop, his rule was firm and judicious. A disregard of etiquette was about the worst thing ever alleged against him: he was not disposed to make much difference between a rector and his curate. His activity as an author was not stifled by his energetic discharge of his public duties; indeed, he seems to have been always either writing a book or affording literary help to others. Besides many charges, sermons, and a few pamphlets, his singularly vigorous and independent *Kingdom of Christ Delineated*, one of the most remarkable of his works; his *Introductory Lectures to the Study of St. Paul's Epistles;* his *English Synonyms;* and his annotated edition of Bacon's *Essays*—one of the best examples of good editing in the English language—belong to this period of his life. A work, published anonymously 1855, *Scripture Revelations respecting Good and Bad Angels*, has been generally ascribed to Whately.

The world's esteem and the regard of W.'s friends steadily increased in his later years. In early life there was much about him to shock the fastidious, and some things which might hurt the sensitive; but his peculiarities softened and

wore off as he advanced in years. At Oxford he was noted for his unconventional, unceremonious manners, for which (together with his white hat, rough whitish coat, and white dog) he was nicknamed the White Bear; and for the plain speaking and rough ridicule with which he would overwhelm an opponent in an argument. He was remarkable, too, for his fondness for athletic sports, which he indulged with indifference to the minor proprieties. He used to say that his abrupt and careless and seemingly unfeeling ways were a recoil from the painful shyness for which he had been remarkable in his youth. Those who knew him, however, made light of his peculiarities; and few things about him are more pleasing than his firm belief in the merits of his friends, and the number, the warmth, and the permanence of his friendships. He had great talents for conversation, and was famous for his bon-mots, happy repartees, and conversational pleasantries of every kind. His writings are remarkable not so much for subtlety of thought or novelty of view as for strong logic, acuteness, felicity of arrangement and exposition, and for the frequency and homely force of his illustrations. He had the happy power of building up materials which might be old into a new, commodious, and symmetrical structure. He did nothing for ornament's sake: though his imagination was abundantly fertile, it was used only to illuminate his argument; his images are seldom impressive for their beauty, though admirably fitted for didactic purposes. His theological works have been charged with a 'cold rationalistic' tendency, and with lack of reverence, and of due orthodoxy in doctrinal statements; but these criticisms may be charged probably to the critic's point of view. Besides his notable treatise on *Logic*, his *Historic Doubts*, the *Essays on the Peculiarities of the Christian Religion*, the *Errors of Romanism*, and the *Kingdom of Christ* are perhaps the most valuable and characteristic of his writings.—The *Life and Correspondence of R. Whately, D.D.*, etc., by his daughter (London 1866), is an interesting though in some respects partial and inadequate memorial of him: the letters, however, which form a great part of it, give an excellent impression of the qualities which distinguish his works.

WHAULE-EYE, n. *hwawl'i:* see WALL-EYE.

WHEAL, n. *hwēl* [Cornish *huel*, a mine]: in *Cornwall, England*, a mine.

WHEAL, n. *hwēl*, or WEAL, n. *wēl* [AS. *walu*, a weal (see also WALE 1)]: the raised streak left on the skin by a stripe, as with a cane; red and white marks on the skin, seen in cases of nettle-rash.

WHEAT, n. *hwēt* [AS. *hwæte;* Goth. *hvaiteis*, wheat—from Goth. *hveits*, white (see also WHITE)]: a cereal grass of the genus *Triticum*, or the grain which it produces (see below). WHEATEN, a. *hwēt'n*, made of wheat. WHEAT-EEL, a disease in wheat; same as *Purples* (q.v.). WHEAT-MIDGE, n. same as WHEAT-FLY (q.v.). *Note.*—WHEAT-GRAINS, after being cleansed, are ground, the produce thus formed being termed *wheat-meal*. 1. BRAN is the outer husks of the *wheat-grains*, and is first separated from the *wheat-meal* by sifting; 2. SHARPS, also called COMMON-THIRDS or POLLARDS, are sifted out of the bran by brushing or sieving, and are simply the finer portions of the *wheat-husks* or *bran;* 3. SECONDS, or MIDDLINGS, are sifted from the *wheat-meal* after the bran; 4. COMMON FLOUR, or OVERHEADS, and PAIRING-MEAL, or FINE-THIRDS, are two qualities obtained by regrinding the *seconds*, and sifting; 5. FINE FLOUR is the produce obtained after such separations. BOLTING, the sifting processes through which wheat-meal is first made to pass—hence *wheat meal* is termed *unbolted flour*, and in the United States *chop*.

WHEAT: valuable cereal grass of the genus *Triticum;* distinguished by a spike with many-flowered spikelets, without stalks, seated one on each notch of the rachis, their sides directed to the rachis, which is zigzag; and two glumes, of which the lower is either awned or awnless; the outer palea of each floret having at the top a notch, in the centre of which is the terminal point, sometimes prolonged into an awn, or, in some species, with many florets tapering into an awn without a notch. A number of varieties are found in Britain, of which *T. repens*, well known as Couch Grass (q.v.), is the most common; but the seeds of none of them are of any value. The native country of the cultivated W. is uncertain, but has generally been supposed to be the central part of Asia.

Botanists differ greatly in regard to the origin of W., some holding that it has undergone comparatively little change, while others believe that it has been developed from the *Ægilops ovata*, a grass somewhat resembling W., found near the Mediterranean Sea. They differ also regarding the number of species, some naming over 30, while others refer the hundreds of varieties and sub-varieties to a single species.

W. has been cultivated from the earliest ages, and was a chief crop in ancient Egypt and Palestine, as it still is in all temperate parts of Europe, Asia, and Africa. It is very largely grown in and exported from India. Vast areas in central Canada and the n. part of the United States are admirably adapted to its cultivation, as are also considerable portions of S. America and Australia. In the torrid zone W. does not thrive, except in elevated situations; but it yields well in subtropical regions, though it is a hardy plant, and when covered by snow endures even very severe winters. For its successful cultivation, however, it requires a mean temperature of at least 55° F. for three or four months of the year. Consequently it cannot be grown as far n. as barley, oats, or rye. It was

brought to America by the Spaniards about 1530, when they began raising it in Mexico. In 1602 Gosnold sowed W. on one of the Elizabeth Islands, in Buzzard's Bay, and 9 years later it was introduced into Va. For a long time the centre of production for the United States was in Penn.; but since 1855 it has been rapidly moving west.

COMMON W. (*T. vulgare, æstivum*, or *sativum*) grows to a height generally of 3 or 4 ft., and has ears or spikes generally 3 or 4 inches long, the spike 4-cornered, the spikelets about 4-flowered; the paleæ ventricose, ovate, truncate, mucronate, or awned, compressed under the point, rounded at the back, the grain free. In consequence of long cultivation, in a great variety of climates, the cultivated varieties of W. are very numerous. New varieties are continually coming into notice, many of which are popular in the regions of their origin, though little known beyond them. Some botanists have attempted to distinguish species among them, appropriating the name *T. æstivum* to the awnless kinds, and *T. hybernum* to the awned; but intermediate forms are very numerous, and the length or shortness of the awn seems to depend on accident. Besides being classified as bearded and smooth, the varieties in cultivation are distinguished also by the color, as *white* and *red;* and as soft or hard wheats, according to the texture of the grain.

Although W. succeeds in a great variety of soils, it thrives better in either clay or loam than in sand, as the former are more compact than the latter and contain a larger proportion of the mineral elements which the plant requires. Wet lands need to be thoroughly underdrained to fit them for this crop. W. will follow corn well if the land was liberally manured and kept free from weeds; but many farmers prefer to sow it on an inverted clover sod. A system of rotation (see ROTATION OF CROPS) will give larger yield, tend to prevent the excessive multiplication of insect enemies, and in other ways is much better than raising W. many years in succession on the same land. It is well to do the plowing some weeks before the time for putting in the seed, as this will allow the ground to settle, and thus get into better mechanical condition than would otherwise be possible. But just before sowing, the surface soil must be made very fine and mellow. Though in many respects a hardy plant, W. is a rather delicate feeder and does not have the power of so completely abstracting from the soil the elements which it requires and which the land contains as some other plants do. This makes it necessary that an abundance of plant food be supplied, and in a condition to be readily assimilated. Thoroughly decomposed barnyard manure is excellent; but fresh manure has a tendency to promote large growth of straw with but little grain, and is also liable to introduce the seeds of foul plants. Commercial fertilizers (see FERTILIZERS) often give excellent results: this is true particularly of those prepared with special reference to the requirements of this crop. On many soils lime is highly beneficial in giving strength to the straw and increasing the quantity of the

grain: to some extent it serves directly as food for the plants, but more largely in preparing for their use the organic matters and the silicate of lime which the soil contains.

The variety of W. to be grown should be selected with reference to the climate; to the character, condition, and adaptation of the soil; to the wants of the grower, and the demands of the market. In some regions spring W. thrives much better than winter, and about ⅓ of all the W grown in the United States is of spring varieties. The average yield per acre of spring W. is a little higher than that of the winter kinds. When grown under equally favorable conditions there appears to be very little difference in vigor and productiveness between the white and the red or the bearded and the smooth kinds; but some growers claim that the red varieties are less liable to injury from bad weather after harvesting than the white kinds. There is little difficulty in finding a variety adapted to the prevailing conditions in any part of the country, and the plant is so susceptible to modifications that by a careful selection of the finest grains and growing on good soil a marked improvement in yield and quality can be secured in a few years. Some excellent varieties have been obtained also by hybridization (see HYBRID). The best grain should be selected for sowing, and be very carefully cleaned to free it from the seeds of weeds and other plants. Measures should be taken to destroy any spores of smut (see SMUT) which may adhere to the grain. Seed not more than one year old is best for sowing. The quantity of seed required per acre varies somewhat with the variety and the condition of the soil. A fair average may be stated as 1½ bushels if sown broadcast, and 1 bushel if drilled. The latter method is greatly to be preferred (see SOWING OF SEED). At the north, winter W. should be sown in Sep., and at the south in Oct. or Nov. Spring W. is to be sown as soon as the ground is dry and warm and can be got into proper condition to receive the seed. Many carefully conducted experiments indicate that rather shallow covering (1½ to 2 in.) is better than deeper planting. In some countries the growing W. receives considerable cultivation, but in the United States this is seldom attempted, though various tests have shown that where drill-sowing is practiced it might be made profitable. The winter varieties of W. at the n. are ready to harvest in July, and the spring sorts in Aug. Where only small quantities are grown, the cutting is sometimes done with a sickle, but usually with a cradle, which has almost entirely superseded the former instrument; but where W. is grown to a large extent, it is cut by machines (see REAPING). Rather early cutting is desirable, as it prevents much waste of grain by shelling in the field, and gives a whiter flour and a better quality of straw. When sufficiently cured, the W. is stacked, or else drawn to the barn. Where only a few acres of W. are grown on any one farm, threshing is done with a flail or a small horse-power machine: one of the latter often supplies the needs of all the growers in the

neighborhood. In regions in which large quantities of W. are produced, large machines, driven by horse or steam power, are employed (see THRESHING). Considerable quantities of W. are converted into starch and glucose, a little is used for manufacture of alcoholic liquors, but most of it is made into flour (see FLOUR). The Bran (q.v.) is a valuable food for cows giving milk, and is profitably fed to some other classes of live-stock. The straw is sometimes used for feeding: for this purpose it should be carefully cured and should be used in connection with oil meal, Indian meal, or bran. It is largely used also for manure, and for manufacturing purposes: see STRAW: STRAW-MANUFACTURES.

W. is subject to several parasitic diseases, of which the principal ones are rust and smut, and which often prove very destructive. The *rust* is a microscopic fungus which spreads and multiplies with extreme rapidity by means of spores blown about by the wind (see RUST—disease). This disease is much more destructive in damp than in dry weather, affects some varieties far more than others, and, like all other diseases of this class, is much more likely to attack weak plants than those which are strong. Many careful observers believe that rust is sometimes generated on and disseminated from barberry bushes (see BARBERRY). It may also be spread by the use of undecomposed straw from affected fields. *Smut* also is propagated by spores. Preventive measures, for both rust and smut, consist in thorough drainage, not only of the surface ground but also of the subsoil; supplying liberal quantities of the mineral elements required for perfect development of the grain and straw, together with a sufficient but not excessive quantity of nitrogen; selecting a good quality of seed of hardy varieties; washing the seed in a solution of blue vitriol or in hot water (see SMUT); and sowing lime over the plants, in the early spring, when they are wet with dew (see BUNT: MILDEW). W. is exposed to the attacks of several insect enemies. Among these are the Chinch-bug (q.v.), which in some seasons, particularly those which are dry, causes immense losses to grain-growers. The artificial spreading among these insects of a very contagious and fatal disease is a recently discovered method of defense against their ravages, and promises to be highly successful. The Wheat-fly (q.v.) is sometimes very destructive, as is also the Hessian fly (see HESSIAN FLY: also CORN MOTH WIRE-WORM: EAR-COCKLES). Thorough preparation of the land, use of suitable fertilizers and of whatever tends to promote vigorous growth and full development of the plant, will lessen the degree of injury which W. will suffer from insects.

The composition of W. varies considerably with the climate, soil, and variety. Gluten, its most valuable food constituent, is found in larger proportions in American than in English W.; and in W. grown in the southern there is more than in that grown in the northern United States. Among leading varieties of W. grown in this country are: the Fultz, a red winter sort from Penn., which

was distributed by the U. S. dept. of agriculture 1871, and is now (1892) much more extensively grown than any other kind; the Red Mediterranean, also a winter sort, imported from France about 1875; the Clawson, a hardy winter kind with red chaff and white kernel; and the Fife, a spring variety very largely grown in the n.w. Nearly half of the W. grown in this country is represented by these 4 kinds. Other sorts are the Diehl, Garfield, Surprise, Canadian Velvet Chaff, and Bonnell—all white winter kinds. The Black Sea, White Russian, Defiance, and Champlain (the latter two hybrid sorts) are popular spring varieties. Soft varieties are preferred for manufacture of starch, but the hard sorts, containing larger proportion of gluten, are better for flour: see FLOUR.

SPELT (*Triticum spelta*) is regarded as a distinct species from Common W., and is supposed to be a cultivated form of *Ægilops caudata*, native of the countries near the Mediterranean. The spikelets are smaller than in Common W., and each spikelet has two or three, rarely four, perfect florets, besides a barren terminal one; the outer glumes and the paleæ are very broadly truncate at the top, and notched; the awns very slender; the ripened grain adheres closely to the paleæ or chaff. Spelt is supposed to be the grain called *Zea* by the Greeks and *Far* by the Romans. It is of little value in comparison with W.; but can be grown on inferior soils, and is cultivated in Switzerland at an elevation where W. would not thrive. The bread made of it is coarse, and is used chiefly by the poorer classes.—Another species, sometimes called LESSER SPELT, or ONE-GRAINED W. (*Triticum monococcum*), is occasionally cultivated on poor soils and in elevated situations in central and s. Europe: it is sometimes called St. Peter's Corn.

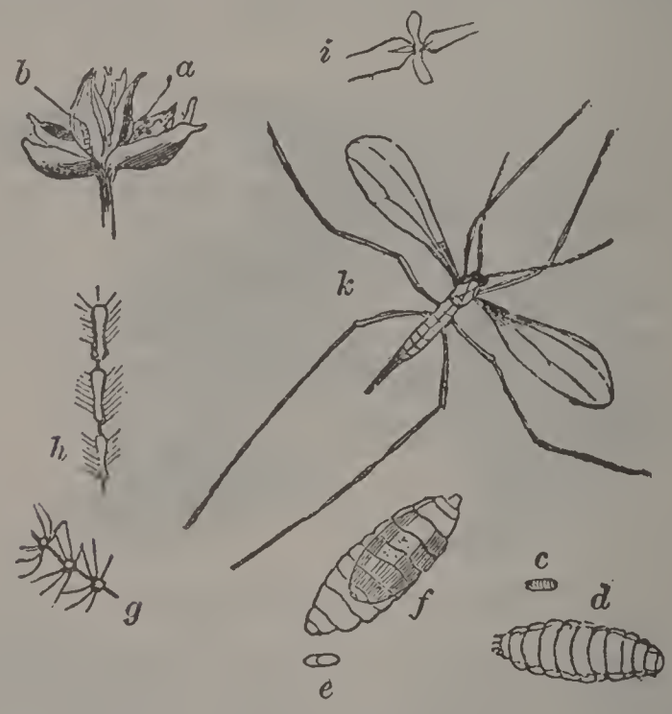
The total quantity of wheat produced in the U. S. for the calendar year preceding the fiscal year ending 1905, June 30, was 552,399,517 bushels; exports of domestic wheat and wheat flour 44,112,910 bushels; domestic wheat and wheat flour retained for consumption, 508,-286,607 bushels: imports of wheat and wheat flour, 3,286,190 bushels; exports of foreign wheat and wheat flour, 587,473 bushels; total consumption, wheat and wheat flour, 510,985,324 bushels; per cent of domestic product exported, 7.99. The greatest wheat producing states, 1905, were Kansas, 77,001,104 bushels; North Dakota, 75,623,044, and Minnesota, 72,434,234 bushels. Next comes Nebraska with 48,002,603 bushels, and South Dakota with 44,133,481 bushels. The wheat crop of the world, 1905, was 3,337,400,000 bushels, the greatest producers being U. S., Russia in Europe, 451,327,000; France, 338,785,000; British India, 281,263,000. Hungary comes next with 157,512,000 bushels; Italy, 160,000,000; Argentine, 150,745,000; Germany, 135,947,000; Canada, 113,022,000, and Russia in Asia, 107,903,000.

WHEATEAR, *hwēt'ēr*, or FALLOW-CHAT: a bird of the genus *Saxicola* (*Saxicola œnanthe*), of the family *Sylviadæ*, a common summer visitant of Great Britain, abounding on downs and fallow fields. Its winter retreat is in the countries near the Mediterranean, chiefly in Africa; its summer migrations extend to n. Europe and to Iceland and Greenland. A few spend the winter on the s. coasts of England. The length of the W. is about 6½ in.; the tail is almost square; the wings are long and pointed; and the legs are long, enabling the bird to hop about actively in quest of food. The male is of ash-brown color on upper parts; forehead, a band above the eyes, and throat, white; a black mark from the base of the bill to each eye, and expanding behind it; wings, black; two-thirds of the tail, except the two middle feathers, white; tip of the tail,

Wheatear (*Saxicola œnanthe*).

black; breast, buff-color. The female is less gayly colored, brown and gray prevailing. The W. makes its nest in an old wall, or in a crevice of a quarry or gravel-pit, often in a deserted rabbit-burrow. The male has a pleasant but not loud song, and sings well as a cage-bird in winter as well as in summer. The W. is much esteemed for the table. The shepherds catch them in nooses placed in little excavations made in the ground, advantage being thus taken of the habits of the bird, which upon the least alarm runs to hide itself in any little hollow that may be near. The usual practice of the shepherds is to cut out an oblong piece of turf, about 11 in. by 8, and 6 in. thick, which they lay across the hole that is made, making sloping entrances at the ends of the hole, and setting nooses under the turf in the centre: as many as 84 dozen wheatears have been thus caught by a single shepherd in a day. It is not unusual for a shepherd and his lad to look after 500 to 700 of these traps.—The Yellow-breasted Chat of the United States (*Icteria virens*), olive green, the throat and breast bright yellow, measures more than 7 in., and it has a loud song; it is now included, with other new-world warblers, in the family *Mniotiltidæ*.

WHEAT'-FLY: popular name of certain dipterous insects, often very injurious to wheat-crops. One of them, *Cecidomyia tritici* of Kirby (see CECIDOMYIA), *Triticum vulgare* of Fitch's N. Y. Reports, sometimes called the WHEAT MIDGE, causes great damage. It is the fly which appeared in Vermont 1820, probably imported from the old world into Canada. It destroyed a tenth part of the wheat-crop for several years, disappearing only on being starved out in that region by a change of crop, or by late spring sowing of wheat. It spread in a few years e., s., and w. In N. Y. 1854 the damage was estimated at $15,000,000, and the value of wheat lands soon fell from $70 to $40 per acre in w. N. Y. The first public notice of it in England was in 1740; and, very curiously, its first con-



Wheat-fly (*Cecidomyia tritici*).
(From Morton's *Cyclopædia of Agriculture.*)
a, larva in spikelet of wheat; *b*, pupa in the same; *c*, larva, natural size; *d*, the same, magnified; *e*, pupa, natural size; *f*, the same, magnified; *g*, a few joints of one of the antennæ of a male wheat-fly; *h*, the same of female; *i*, female wheat-fly, natural size; *k*, the same, magnified.

siderable ravages were simultaneous with its destructiveness in America. First noticed in France 1842, it became very injurious about the same time (1854–5) that it laid waste the crops of w. N. Y.—The eggs are deposited in the wheat when it is coming into flower, and the larvæ, abstracting the juices, cause the grain to shrivel. The perfect insect appears in June, when great numbers may sometimes be seen on wing in the evening, their chief time of activity. It is about one-tenth of an inch in length, pale ochreous or orange, downy, with large black eyes and long slender legs; the male with very long antennæ. The male, however, is so very minute that in 1859 it had been recognized only by Dr. Asa Fitch and by

a German entomologist. The antennæ of the male differ much in structure from those of the female, as will be seen by the annexed figure (*g*, *h*), and are of 25 joints, while those of the female have only 12. The size and coloring are variable, but Dr. Fitch describes the constant characters of the female thus: body bright orange or lemon yellow, tarnished with smoky on the back forward of the wings, which are clear and glassy, with a small cross-vein near their base; the antennæ, about as long as the body, are composed of 12 oblong joints, narrower in their middles and separated by short pedicels. The remedies that he favors are burning the thresher screenings, and deep plowing to kill the larvæ left in the ground. The larvæ are small, and orange or lemon-colored. A little black ichneumon lays its eggs in the larvæ of the wheatfly, and is thus useful to the farmer by destroying it.—The name wheatfly is given also to species of the genus *Chlorops* (see CORN FLY), destructive to wheat.

WHEAT'LAND: a famous estate and former residence of President James Buchanan, located a mile from Lancaster, Pa.

WHEATLEY, *hwēt'lĭ*, PHILLIS: negro poetess: about 1753-1784, Dec. 5; b. Africa. She was brought to this country as a slave 1761, was bought by John Wheatley, of Boston, taken into his family, and educated by his daughters. She developed remarkable brightness in acquiring an education, and at 14 years of age began to write poetry. In 1773 a volume of her poems, with a portrait, was published in London. She went to England the following year, where she was kindly received by the Countess of Huntingdon and others. In 1775 the family of her benefactors, the Wheatleys, being broken up by death, she attempted to support herself, but failing, her last days were spent in poverty. She died in Boston.

WHEATON, Ill.: city, county-seat of Du Page co.; on the Chicago and Northwestern railroad; 25 m. w. of Chicago. It is in an agricultural and stock-raising region. It has industrial establishments connected with farm and dairy products, and ships annually considerable hay, vegetables, wheat, flour, live-stock, and dairy products. The water-works plant cost originally $60,000. The city has eight churches, Wheaton College (Congregationalist), a high school, opened in 1874, public and parish schools, a public library presented by J. Q. Adams, and a college library. Pop. (1900) 2,345; (1910) 3,423.

WHEATON COLLEGE: located at Wheaton, Ill., 25 m. from the centre of Chicago. It had its beginnings in Illinois Institute, founded by the Wesleyan Methodists in 1856. In 1860 the institute was sold to a board of trustees affiliated with the Congregationalists, and was chartered under the name of Wheaton College. The or-

ganization includes in addition to the regular collegiate department, an academy, a business department, a conservatory of music, and an art department. Women are admitted to all courses. There are four collegiate courses offered, the classical, the literary, the Latin scientific, and the English scientific; the degree of A.B. is conferred for the completion of any of these courses; before 1903, the three degrees of A.B., B.L. and B.S. were conferred. Certain studies are required of all students; and each course has in addition other required studies; the rest of the work is elective, the scientific courses having the least elective work. The college has a campus of 13 acres on a slight elevation in the city; the buildings are the main buildings, the woman's building, and the gymnasium. The library contains 5,000 volumes; the Adams Memorial Library, a short distance from the college, is also open to students. The students number 250.

WHEATON, Frank: soldier: b. Providence, R. I., 1833, May 8; d. 1903. He was educated at the public schools, and studied civil engineering at Brown University; 1850-55 was engaged in the United States boundary surveys; 1855, Mar. 3, commissioned first lieutenant in the 1st United States cavalry; served till 1860, June, on frontier duty; 1861, Mar., promoted captain; 1861, July 16, appointed lieutenant-colonel of the 2d Rhode Island volunteers, and colonel after the first battle of Bull Run; 1869, Nov., appointed brigadier-general of volunteers; commanded a brigade in the 6th corps and a division at Gettysburg. For gallant services on the field he was brevetted brigadier-general of volunteers, and subsequently brevetted major-general of volunteers; 1866, July 28, appointed lieutenant-colonel of 39th United States infantry, and 1874, Dec. 15, colonel of the 2d infantry. In 1893, April, he was promoted brigadier-general United States army; 1897, April, major-general, and was retired May 8, following. After the war he held commands in the west.

WHEA'TON, Henry: jurist and diplomatist: 1785, Nov. 27—1848, Mar. 11; b. Providence, R. I. He was educated at Brown University; admitted to the bar 1802; after which he spent several years in France, and 6 months in London, in legal and literary studies. On his return he resided in New York, where he contributed papers on international law to the *National Advocate*, a daily newspaper, and was appointed a justice of the marine court. In 1815 he published *Digest of the Law of Maritime Captures or Prizes*, one of the standard works on the subject. About the same time he published *Essay on the Means of Maintaining the Commercial and Naval Interests of the United States*. He was reporter of the proceedings of the United States supreme court 1816-27. His Reports (12 vols.) a distinguished German has called 'the Golden Book of American Law'; and with the legal profession it ranks as a work of extraordinary

ability and value. He made frequent contributions to the *North American* and *American Quarterly Reviews*, and delivered addresses before literary societies. In 1825 he was engaged in revising the statute laws of New York; 1826 he wrote his *Life of William Pinckney*, of which he furnished an abridgement for Sparks's *American Biographies*. In 1827 he was appointed United States *chargé d'affaires* to Denmark, and resided at Copenhagen till 1835, when he was appointed resident minister at Berlin, and 1837-46 was minister plenipotentiary: the latter place he resigned on the demand (widely censured) of President Polk, who saw need of the place for another appointment. His *History of the Northmen* appeared at Philadelphia, London, and Paris, 1831; *Elements of International Law*, 1836; his essay, entitled *L'Histoire de Droit des Gens en Europe, depuis la Paix de Westphalie jusqu'au Congrès de Vienne*, 1841.

WHEATON, Lloyd: American military officer: b. Fairfield, Mich., 1838, July 15. He entered the Union army at the outbreak of the civil war with rank as sergeant and served through the war, receiving promotion to captain of volunteers in 1862, major in 1863, and lieutenant-colonel in 1864. In 1866 he was appointed captain in the regular army, was subsequently employed on frontier duty, and on the outbreak of the Spanish-American war in 1898 he was appointed brigadier-general of volunteers, was assigned to duty in the Philippines in 1899, and in 1900 received rank as major-general of volunteers. He was engaged in all the important engagements in the Philippines, and in 1900-2 was in command of the departments of North Luzon and the Northern Philippines. He was promoted brigadier- and major-general in 1901 and in 1902 was retired.

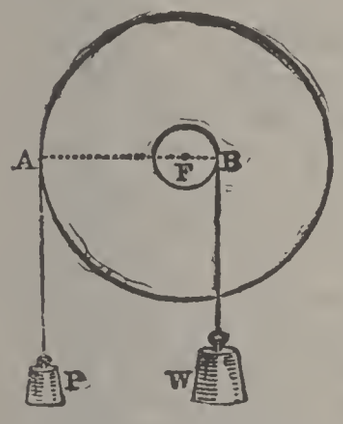
WHEATSTONE, Sir Charles: English physicist: b. Gloucester 1802, Feb.; d. Paris 1875, Oct. 19. He commenced business for himself in London as a maker of musical instruments, and in 1823 attracted the attention of scientists by the publication in *Thomson's Annals of Philosophy* of a paper entitled *New Experiments on Sound*. In 1834 he was appointed professor of experimental philosophy in King's College, London, and in 1836 exhibited at King's College experiments showing the velocity of electricity. For this purpose he used a circuit of four miles of copper wire. These experiments suggested to him the idea of applying his apparatus to telegraphing. In 1837, with W. F. Cooke, he took out the first patent for magnetic telegraph, but no practical application of this was made till after the Morse telegraph had been operated. Another subject that engaged much of his attention was vision, on which he published various papers, among them a memoir contributed to the *Philosophical Transactions* in 1848, *On Some Remarkable and Hitherto Unobserved Phenomena of Binocular Vision*. He was knighted in 1868.

WHEDON, *hwē'don*, DANIEL DENISON, D.D, LL.D., Methodist Episc. minister, and author: 1808, March 20—1885, June 8; b. Onondaga, N. Y. He graduated at Hamilton Coll. 1828; studied law; was teacher in Cazenovia Seminary 1830–1; tutor at Hamilton 1831–2; and prof. of ancient languages and literature in Wesleyan Univ., Conn. 1833–43. After ordination in the Meth. Episc. Church, he was stationed at Pittsfield, Mass., 1843–45, and Jamaica, L. I. For 7 years from 1845 he was prof. of logic, rhet., and hist. in Mich. Univ., and for 28 years from 1856 editor of the *Meth. Quarterly Review* and of the publications of the Meth. Book Concern. Besides numerous review articles, he published *Public Addresses* (1856); *Commentary on Matthew and Mark* (1860); the *Freedom of the Will*, reviewing Jonathan Edwards and others (1864); *Commentary on the N. Test.*, 5 vols. (1860–75); *Commentary on the O. Test.*, 7 vols. A posthumous volume was published, *Essays, Reviews, and Discourses* (1887). He died at Atlantic Highlands, N. J.

WHEEDLE, v. *hwē'dl* [Ger. *wedeln*, to wag the tail to fan—from *wedel*, a fan, brush: the transition from *fanning* to *flattering* would not be difficult]: to persuade by coaxing or flattery; to flatter in order to gain a private end; to entice by soft words; cajole: N. cajoling with soft words. WHEE'DLING, imp. *-dling:* ADJ. enticing, as by soft and flattering words: N. the act of flattering or enticing by soft words. WHEEDLED, pp. *hwē'dld.* WHEE'DLER, n. *-dlėr*, one who wheedles.

WHEEL, n. *hwēl* [AS. *hweol;* Dan. *hiul;* Icel. *hvel*, anything circular, a wheel: Dut. *wiel*, a wheel: W *chwyl*, a turn, a course: comp. Gael. *cuidhill*, to wheel, to roll]: a circular frame of wood or metal arranged to turn on an axis; an apparatus or machine consisting essentially of a wheel, or of which a wheel is the principal part, used for some special purpose, as a spinning-*wheel*, a potter's-*wheel*, a mill-*wheel*, a steering-*wheel* (the circular frame with short projecting handles on its outer edge by which the steering-gear of a ship is controlled and the ship steered), a bicycle, etc.; an instrument of torture on which persons were formerly tortured and put to death in some countries (see WHEEL, BREAKING ON THE); a turning about, as on a pivot, as a body of soldiers; rotation; revolution; a compass about: V. to move on wheels; to convey on wheels; to turn on an axis; to have a rotatory motion; to whirl; to move round; to cause to turn round; to take a circuit round; to make a whirl round; to provide with wheels. WHEEL'ING, imp.: ADJ. conveying on wheels; turning: N. the act of conveying materials, as on a wheelbarrow; a turning or circular movement of a body of troops. WHEELED, pp. *hwēld:* ADJ. provided with wheels. WHEEL'ER, n. *-ėr*, one who wheels; the horse next the wheel; a shaft-horse as distinguished from a leader, in driving tandem; a wheelwright. WHEELBARROW, a barrow with one or more wheels: the most common form has a wheel at one end and two shafts at the other, by which it is held up with the hands, and so driven forward or pulled. WHEEL-PLOW, or WHEEL-

PLOUGH, a plow having one or two wheels attached, for rendering the instr. more steady to hold, and for regulating the depth of the furrow. WHEELSWARF, *-swârf* [prov. Eng. *swarf*, the dust and grit from grindstones used in grinding cutlery]: a clayey cement made in Sheffield from the dust resulting from the wearing of grindstones, used in the steel-converting furnaces for covering the layers of iron and charcoal. WHEEL-WINDOW, a circular window with radiating mullions resembling the spokes of a wheel. WHEELWRIGHT, one whose trade is to construct wheels and wheel-carriages, as carts. WHEEL AND AXLE, the second of the Mechanical Powers (q.v.), a modification of the Lever (q.v.), consisting in its most primitive form of a cylindrical axle, on which a wheel, concentric with the axle, is firmly fastened. When employed for raising heavy weights, the weight is attached to a rope wound round the axle, and the power is applied either to a rope wound round the grooved rim of the wheel, or to a handle fixed at right angles to the wheel's rim (in the latter case the wheel may be dispensed with, unless it is useful as a conservator of momentum [see FLY-WHEEL], and an ordinary winch substituted). The figure exhibits a transverse section of the common form of the wheel and axle, and shows that it is neither more nor less than a lever, whose extremities are not points as in the normal form, but the circumferences of the circles, whose radii are FA and FB. Accordingly, the power and weight are attached not to particular points in these circumferences, but to cords wound round them; thus the imaginary simple lever, AB (formed by joining the points where the cords become tangents to the circles), is preserved unaltered in position and magnitude. The conditions of equilibrium are, that $P \times AF = W \times FB$, or, since the circumferences of circles are proportional to their radii, that P : W :: circumference of axle : circumference of wheel. When there is no wheel, but only a winch, the circumference described by the power in one revolution is substituted for the circumference of the wheel. The *capstan* and *windlass* are simple and common examples of this mechanical power; and combinations of toothed wheels, or of wheels from one to another of which motion is communicated by an endless band, are compound illustrations of the same. See WINDLASS.



WHEEL, BREAKING ON THE: barbarous mode of inflicting the punishment of death, formerly in use in France and Germany, where the criminal was placed on a carriage-wheel, with his arms and legs extended along the spokes, and, the wheel being turned round, the executioner fractured his limbs by successive blows with an iron bar, which were repeated till death ensued. There was considerable variety in the mode in which this punishment was inflicted, at different times and in different places

By way of terminating sooner the sufferings of the victim, the executioner was sometimes permitted to deal two or three severe blows on the chest or stomach, known as *coups de grâce;* and occasionally, in France at least, the sentence contained a provision that the criminal was to be strangled after the first or second blow. Mercy of this kind was, however, not always allowed to the victims of the wheel: when Patkul, envoy of Peter the Great, was put to death on the wheel by order of Charles XII. of Sweden, it is said that the officer in command of the guard was cashiered by the Swedish king for having allowed the head to be struck off before life was extinct in the mangled limbs. The punishment of the wheel was abolished in France at the Revolution; in Germany it has been occasionally inflicted during the 19th c., for treason and parricide.

WHEEL'-ANIMALCULE: see ROTATORIA.

WHEELER, *hwē'lēr*, ANDREW CARPENTER, American journalist and author: b. New York 1835, July 4; d. Monsey, Rockland co., N. Y., 1903, Mar. 10. He began newspaper work on the New York *Times*, and later became city editor of the Milwaukee (Wis.) *Sentinel*. Soon after the outbreak of the civil war, he went with the Federal army as correspondent for several eastern and western papers; and afterward, following two years of incidental writing for the Chicago press, joined the New York *Leader* staff, then numbering many prominent names. For a time he wrote for the *Leader* dramatic critiques over the signature 'Trinculo.' Then he became dramatic and musical critic of the *World*, and began writing the articles signed 'Nym Crinkle.' Later still he was on the staff of the *Sun*. As 'Nym Crinkle' he published *The Chronicles of Milwaukee* (1861); *The Toltec Cup; The Primrose Path of Dalliance; The Iron Trail;* and other books. Latterly, having withdrawn from journalistic work, he published under the new pseudonym 'J. P. Mowbray' (or J. P. M.), two series of essays and two books of fiction—*A Journey to Nature* (1901); *The Making of a Country Home* (1902); *Tangled Up in Beulah* (1902), and *The Conquering of Kate* (1903). His authorship of these later works was not known until after his death.

WHEELER, BENJAMIN IDE, American college pres.: b. Randolph, Mass., 1854, July 15. He was graduated from Brown Univ. in 1875, and afterward studied for four years in Germany, traveling also in Greece. He was subsequently engaged as an instructor at Brown, Harvard and Cornell, and in 1886 was appointed professor of philology at the last named university, receiving the chair of Greek in 1888. In 1896 he accepted the directorship of the American School of Classical Studies, at Athens, Greece, and since 1899 has been pres. of the

Univ. of California. He was editor of the dept. of philology in Johnson's *Universal Cyclopædia* and in Macmillan's *Dictionary of Philosophy and Psychology*, and has written: *The Greek-Noun Accent* (1885); *Analogy and the Scope of its Influence in Language* (1887); *Introduction to the History of Language*, joint author (1890); *Organization of Higher Education in the United States* (1896); *Dionysos and Immortality* (1899); *Life of Alexander the Great* (1900); etc.

WHEEL'ER, Joseph: soldier: b. Augusta, Ga., 1836, Sept. 10; d. Brooklyn, N. Y., 1906, Jan. 25. He was graduated from the United States Military Academy in 1859; served in several scouting expeditions against Indians in Kansas and New Mexico; in Feb. 1861 resigned his commission, and in April following was made a first lieutenant of artillery in the army of the Confederate States. In Sept. he became colonel of the 19th Alabama infantry. He commanded a brigade at Shiloh and was selected to command the rear guard when, at the end of the second day's fighting, the Confederates retired from the field. By reason of his success as commander of the rear guard and his equally successful command of the salient outpost at Corinth, he was appointed head of the cavalry of Bragg's army. As such he led the advance in every forward movement of the forces and commanded the rear guard with the exception of Hood's Nashville campaign. In Aug. and Sept. 1862 he led Bragg's advance into Kentucky, and detained Buell until Bragg had captured Mumfordsville. At Perryville he led a brilliant charge and captured a battery. Ordered to cover the retreat of Bragg's army, he made possible that general's successful escape, with large supply trains, to Cumberland Gap. Rosecrans on Dec. 25 moved forward to attack Bragg before Murfreesboro. Wheeler skilfully retarded Rosecrans' advance and during the battle was, in the words of Bragg's official report, 'pre-eminently distinguished.' He was commissioned major-general in 1863, Jan., and in June and July took a prominent part in the battles attending Bragg's retreat to Chattanooga. At Chickamauga he defeated the right flank of Rosecrans' army, penetrated to the rear and defeated Watkins in a severe combat. He fought in the Knoxville campaign in November, and on the 27th, with Cleburne, defeated Hooker at Ringgold Gap. During the spring of 1864 he aided in opposing Sherman's advance from Dalton to Atlanta, commanding the cavalry of the Confederate right wing, under Johnston and Hood. In 1864 Aug. 10 he was again in the rear of Sherman's army, capturing supplies, burning bridges and destroying railways. He went as far as

the Kentucky line in eastern Tennessee, and then proceeded to northern Alabama. It was impossible, however, to arrest Sherman's advance or to destroy his communications. Wheeler was then sent in advance of Sherman's army, keeping the Confederate government and commanders advised of the enemy's movements and preventing foraging parties from leaving the main force. He thus restricted the spoliation of Georgia to a comparatively narrow area. He defended Macon, Augusta and Savannah, and defeated Kilpatrick at Aiken and Johnsonville. He was promoted lieut.-gen. on Feb. 28 and commanded Johnston's cavalry until the surrender of the Confederate armies. After the war he studied law; and was also a cotton planter. In 1880 he was declared elected to congress from Ala. as a democrat; but his election was contested by W. M. Lowe, and he lost his seat. In 1881 Lowe died and Wheeler was elected and represented his district in congress continuously till 1898. When hostilities between Spain and the United States began W. was appointed major-general to command the cavalry division and, although 61 years old at the time (1898), took part in the capitulation of Santiago de Cuba. Receiving his commission May 4, he arrived at Daiquiri, Cuba, with his command June 20-21 and participated in the fighting at Las Guasimas, El Caney, and San Juan Hill. On July 14 he was appointed commissioner to make arrangements for the surrender of the Spanish army; served in the Philippines from 1899, Aug., till 1900, Jan.; was appointed a brigadier-general, U. S. A., 1900, June 16; from June-Sep. in that year commanded the Department of the Lakes, and was retired Sept. 10 following. His publications include: *Account of the Kentucky Campaign* (1862); *History of the Santiago Campaign* (1898); a *History of Cuba* (1899), and 8 vols. of Congressional speeches (1883-98).

WHEEL'ER, Nathaniel: inventor: b. Watertown, Conn., 1820, Sep. 7. He was educated in the public schools, and became a carriage manufacturer. In 1850 Allen B. Wilson, who needed assistance in securing patents on a sewing-machine which he had invented, applied to W. to assist him; and 1852 the machine was patented as the Wheeler and Wilson; and the Wheeler and Wilson Manufacturing Co. was formed 1853. W. served in the Conn. legislature a number of terms as senator and member of the house. He received patents for various other inventions. He died 1893, Dec. 31.

WHEELER, William Adolphus, American lexicographer: b. Leicester, Mass., 1833, Nov. 14: d. Roxbury, Mass., 1874, Oct. 28. He was graduated from Bowdoin in 1853, was engaged in teaching for several years, and subsequently assisted Joseph E. Worcester in the preparation of his *Dictionary* (1856-9). He was afterward

occupied with the revised edition of Webster's *Dictionary* (1864) for which he compiled *Explanatory and Pronouncing Vocabulary of the Names of Noted Fictitious Persons and Places, including Familiar Pseudonyms, Surnames, etc.*, which was issued separately in 1865. In 1867 he was appointed assistant superintendent of the Boston Public Library. He left unfinished an encyclopedia of Shakespearian literature and an index to anonymous literature entitled *Who Wrote It?* The latter, completed by C. G. Wheeler, was published in 1881. He edited Hole's *Brief Biographical Dictionary* (1866); a *Dickens Dictionary* (1873); and also *Familiar Allusions* (1882).

WHEEL'ER, William Almon: statesman, vice-prĕs. of the United States: 1819, June 30—1887, June 4; b. Malone, Franklin co., N. Y. After two years' study in Vermont Univ., he was obliged by the death of his father to relinquish his collegiate course. He began the practice of law 1845 at Malone; was for some years dist.atty. of the county, and a member of the legislature 1849. On the formation of the free-soil party, he became an adherent, and continued with the party under its name republican. He gave up his law practice on account of a throat ailment, and was pres. of the railway from Ogdensburg to Rouse's Point. In 1858-9 he was in the N. Y. state senate, presiding there and in the constitutional convention of 1867. In 1860 he was elected to the U. S. senate, and again in 1869, serving 8 years; and was chairman of the Pacific railway committee, and a member of other important committees—e.g., that on southern affairs, in connection with which he originated the Louisiana compromise of 1873, when two rival governors were in military conflict. In 1876, on the republican ticket with Pres. Hayes, he was elected vice-pres., and after the term of office retired to Malone, where he died. He was known as a man of sterling intellectual and moral qualities.

WHEELERA, *hwēl-ē'ra:* genus of trees of nat. order *Leguminosæ*, sub-order *Papilionaccæ*. The wood of *W. ebenus*, native of the W. Indies and of tropical America, is exported under the name *American Ebony*. It is very hard, of brownish-green color, takes fine polish, and is used by cabinet-makers and musical-instrument makers.

WHEELING, *hwēl'ing:* city, port of entry, and cap. of Ohio co., W. Va.; on the Ohio river and Wheeling creek, and on the Baltimore and Ohio, and its branch lines, including the Ohio River and Cleveland L. and W. railroads recently acquired; the Pittsburgh W. and Ky. and Cleveland and P. railroad of the Pennsylvania system; the Wheeling and L. E. railroad of the Wabash system; the Ohio River and Western railroad and the Wheeling Terminal railway, a belt line connecting all

the roads; 63 m. s.w. of Pittsburgh, 141 m. e. of Columbus; popularly known as the 'Nail City.' It has steamer connections with the Ohio and Kanawha river points and commands a large river trade. It is the largest city in the state, and in commerce and manufactures one of the most important places in its region. The site is an alluvial plain, about 45 ft. above low water, from which the surface rises by hills and bluffs 650 ft. above sea-level. Part of the city, a beautiful residential section, is on Wheeling Island, which is over a mile long and contains 400 acres. The environments are rich in agricultural land and bituminous coal measures. A stone bridge crosses Wheeling creek; a suspension bridge and a modern steel bridge connect W. and Zane's Island, in the Ohio; and two other steel bridges cross the Ohio. The city has two sub-divisions—first, into 8 wards; second, as N., E., S., and Centre W., and Zane's Island.

It is supplied with manufactured and natural gas and electric light plants, thorough sewage, adequate water service, well-paved streets, and about 80 m. of electric street railways in the city and suburbs. The notable buildings include the U. S. custom-house, city-hall and court-house, U. S. Post-office, and Y. M. C. A. building. It is the seat of the Rom. Cath. diocese of Wheeling. Besides a modern public school system, including a high school, opened in 1897, there are the Linsly Institute, Mount de Chantal Acad. (R. C.), St. Joseph's Acad. (R. C.), two business colleges, several parish schools, and a public library with 18,000 vols. Bethany College and the West Liberty State Normal School are located a few miles to the north. The city has the North Wheeling and City hospitals, two private hospitals, several orphanages, a day nursery, and homes for the aged and friendless. There are four clubs occupying their own buildings, three theatres, five daily newspapers.

In 1906 Wheeling had 196 manufacturing establishments, capitalized for $18,227,622, in which were employed 7,215 persons receiving annual wages of $3,842,659. The yearly cost of raw material used was $13,806,723 and the finished products were valued at $23,297,475. The manufacturing establishments include steel and iron plants, with blast furnaces, Bessemer steel works, potteries, sheet and bar mills; cut and flint glass factories; several foundries and machine-shops; and hinge, beer and ale, axle, brick, woolen goods, cigar and tobacco, lumber products, canned goods, wagons and carriages, leather, harness, lantern, sheet steel, steel, gas, and steam pipe, metal coiling, tacks, and tin roofing plants.

There are 15 banks, including two trust companies and two national banks. The combined capital in 1906 was $2,387,000 and the deposits $17,000,000. The clearings for the year ending 1905, Dec. 31, were $41,335,368. The

volume of banking business has doubled since 1899. The chief items of expense are for schools, $130,115.65; gas works and electric light plant, $125,811.89; water-works, $97,467.20; fire dept., $58,786.20; police dept., $39,-817.38; paving and street maintenance, $59,901.08; health, $13,866.50; salaries and miscellaneous, $44,-403.23; interest, $21,113.39.

The Mayor, elected for two years, the Council, Chief of Police, City Clerk, Wharfmaster and Board of Education are chosen by the popular vote. The Board of Public Works, Water and Gas Boards, Chief of Fire Department, Health Officer, City Collector and minor officials are chosen by the council.

W. was settled by three Zane brothers 1769; was long known as Zanesville; had the second strongest defensive works on the w. frontier, erected 1774; which withstood sieges or attacks 1777, 81 and 82; was incorporated as a town 1806; chartered as a city 1836; and was the state capital 1863-70 and 1875-85.—Pop. (1880) 30,737; (1890) 35,013; (1900) 38,878; (1910); 41,641.

WHEELOCK, *hwē-lŏk*, ELEAZER, D.D.: educator: 1711, Apr. 22—1779, Apr. 24: b. Windham, Conn. He graduated at Yale 1733, studied for the ministry, was ordained, and became pastor of the 2d Congl. Church, Lebanon, Conn., where he remained 35 years. In 1754 he opened a school in his own house, and had among his pupils a Mohican Indian, Samson Occum (q.v.), whose rapid progress led to the establishing of a school for Indians. The Moor Indian Charity School at Lebanon was the result, and this school grew into Dartmouth College (q.v.), of which W. was the first pres. In 1766 Occum and Nathaniel Whitaker (q.v.) went to England, and obtained an endowment for the school of £11,000, which was placed in the hands of trustees. W., having secured a large grant of land from the royal gov., John Wentworth, removed the school to Dresden (now Hanover) N. H., 1770.

WHEE'LOCK, JOHN, D.D., LL.D.: second pres. of Dartmouth Coll.: 1754, Jan. 28—1817, Apr. 4; b. Lebanon, Conn.; son of Eleazer W., first pres. He began his collegiate education at Yale; graduated in the first class at Dartmouth 1771; was tutor 1772-74; member of the provincial congress 1774, and of the colonial assembly 1775. In 1777, after serving as major in the N. Y. militia, he was made lieut-col. in the continental army; the next year he led a force against the Indians, and subsequently was aide-de-camp to Gen. Gates. On the death of his father 1779, he was elected pres. of Dartmouth, and taught civil and eccles. history. In 1783 he was wrecked off Cape Cod, and lost the money and books collected in Europe for the college. Owing to doctrinal and other disagreements with the trustees, he was deposed from the presidency 1815, but reinstated 1817.

WHEEL'-WORK: combination of toothed and other wheels by which motion is conveyed. Combinations of this sort are familiar to every one, and have been in use since the days of Archimedes (q.v.), and probably for many centuries before his time. It is only in modern times, however, that the action of such wheels has been critically examined and understood. To a superficial observer the action appears extremely simple: a tooth of the driver pushes against a tooth of the driven wheel, thereby causing that wheel to turn round; and, since by this turning the teeth must become disengaged, it is requisite that, before one tooth let go, a second tooth of the driver be ready to take hold of another tooth of the driven wheel. For this purpose it is enough that the distances between the teeth on the two wheels be alike; in other words, that the diameters be proportioned to the number of the teeth.

When two unequal wheels act on each other, the smaller one turns faster than the larger. Thus, if a wheel with 60 teeth work into one of 20, the latter will turn 3 times as quickly as the former; and it is on this principle that the trains of clock-work are arranged. For example, the *great-wheel* of a common house-clock may have 180 teeth, and may drive a smaller wheel, or *pinion* as it is called, of 15 leaves, and in this case, if the great-wheel turn once in 12 hours, the pinion must turn once in every hour; the axis of this pinion carries the minute-hand. On the same axis the *hour-wheel* is fixed, which may have, say, 96 teeth, and may drive a pinion of 12 leaves. This pinion, then, must turn 8 times per hour, or once in 7½ minutes. On the same axis with this last-mentioned pinion there is fixed the *third-wheel*, having, perhaps, 75 teeth; and this drives a pinion of 10 leaves, which, turning 7½ times as fast, must make one turn per minute. On the axis of this last pinion the *escape-wheel* is fixed. This escape-wheel has 30 teeth, each tooth acting twice upon the pendulum, thus making 60 beats per minute. In such a case as this there is no difficulty in arranging the numbers of the teeth, and these may be varied in many ways, provided the proper proportions be kept. But in other cases considerable skill, and often much labor, is requisite for discovery of the proper numbers. Thus, if it be wished to indicate the moon's age on the dial of a clock, there must be an index turning once in the time between new moon and new moon. This time, which astronomers call a *lunation*, averages 29 days, 12 hours, 44 minutes, and nearly 3 seconds (2·853), and it is far from easy to ascertain what number of teeth will produce this motion. The month-wheel would need to turn rather more than 59 times as slowly as the great-wheel of the clock; and if the mean lunation had been 29½ days, without the odd 44 minutes, the thing could have been managed by making a pinion of 8 teeth lead a wheel of 59 teeth, on the axis of which another pinion, say of 10 teeth, is fixed, and made to work a wheel of 50 teeth. But then such an arrangement would go wrong nearly three-quarters of an hour every month, and in three years would indicate new moon a day too early. In order to ob-

tain a better train, we may compute the number of days in 2, 3, 4, 5 lunations, until we get nearly a number of half days. Now, 16 lunations consist of 472 days, 11 hours, 45 minutes, or almost exactly 945 turns of the great-wheel. This proportion can be obtained by causing a pinion of 12 teeth to lead a wheel of 81 teeth, and another pinion also of 12 teeth to lead a wheel of 105 teeth. This arrangement gives an error of one-quarter of an hour in 16 months, or hardly an hour in 5 years. If still greater precision be required, we must carry the multiples further: 33 lunations make 974 days 12 hours 13½ minutes, or 1,949 turns of the great-wheel of the clock; but then this number 1,949 has no divisor, and it is quite impracticable to make a wheel of 1,949 teeth; so that we must continue our multiples in search of a better train. In this way, when great exactitude is desired, an unexpected amount of labor is often encountered. For reducing this labor, the method of continued fractions is employed, and the toil is further lessened by use of tables of divisors.

Such calculations have to be made for the construction of orreries, by which the times of the revolutions of the planets are shown; also engineers have to make them, as when a screw of a particular pitch has to be cut. If, e.g., we have to cut a screw of 200 turns to the French mètre on a lathe having a leading-screw of 4 turns to the English inch, the axis of the lathe must make 50 turns while the screw makes 39 and a fraction, since the mètre is 39·37079 inches. By applying the method of continued fractions, we discover that for 2,225 turns of the lathe-spindle there must be 1,752 turns of the screw; and as these numbers can be reduced into products—viz., 2,225 into $5 \times 5 \times 89$, and 1,752 into $2 \times 2 \times 2 \times 3 \times 73$—we can easily get trains to produce the required effect. From these illustrations it is apparent that the computation of the trains of wheel-work is intimately connected with the doctrine of prime and composite numbers.

The general sizes of the wheels and the number of the teeth having been decided, the next business is to consider the shape which those teeth ought to have. Now, for the smooth and proper action of machinery, it is essential that the uniform motion of one of the wheels be accompanied by a motion also equable of the other wheel. Two curves have been known to give this quality of equable motion—viz., the epicycloid, formed by rolling one circle on another, and the involute of the circle, traced by the end of a thread which is being wound upon a cylinder, or unwound from it. But the general character of all curves which possess this property has been only lately examined. If it were proposed to construct two wheels which shall have their centres at the points A and B (fig. 1), and the one of which may make 5 turns while the other makes 3, we should divide the distance AB into 8 parts, and assign 5 of these for AC, the radius of the one wheel, the remaining 3 parts for the radius BC of the other wheel. Wheels made of these sizes, and rolling on each other, would turn equably; and if the circumferences be divided into 5 and 3 parts re-

spectively, the points of division would come opposite to each other as the wheels turned. The circumferences of these circles are called the *pitch-lines*, and the portions of them included between two teeth are called the *distance of the teeth:* the distance or arc CD on the one wheel must be equal to the distance CE on the other wheel, in order that the motion may bring the two points D and E together. For a reason that will appear in the sequel, we cannot use

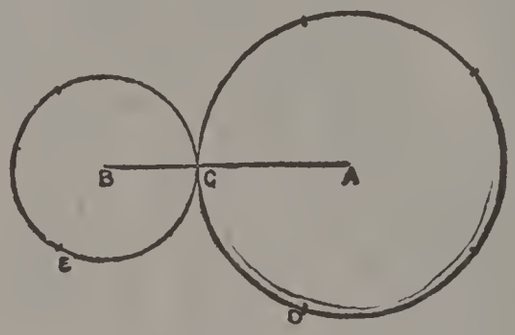


Fig. 1.

wheels with so few as 3 or 5 teeth, and therefore we subdivide the distances CD and CE into some number of parts, say 4, and thus obtain wheels of 20 and 12 teeth instead. Since the tooth of the one wheel must necessarily come between two teeth on the other, the distance between the teeth must be halved, the one half being given for tooth, and the other half for space.

Having then divided off the pitch-line of the wheel B, as in fig. 2, CD being the distance of the teeth, CG the half-distance, let us sketch any contour, CFGHD, for the shape of a tooth, and let us examine what should be the characters of this outline. First, the form of this outline must be repeated for each tooth; secondly, the line should be symmetric from the top, F, of the one to the top, I, of the next tooth, in order that the wheel may be reversible face for face. These obvious conditions having been attended to, let us cut, in thin sheet-brass or other convenient material, a disk having this outline, and let us pin its centre at the point B. Having prepared a blank disk on which the outline of A is to be traced, let us slip it under the edge of the previous one, and pin its centre at the point A. If, now, B and A being held fast, we trace the outline of B upon A, we move each of them slightly, but in the proper proportion forward, and make a new trace upon A, and so continue as far as needed, we shall obtain a multitude of curve-lines marked upon A The line which envelops and touches all these curves is,

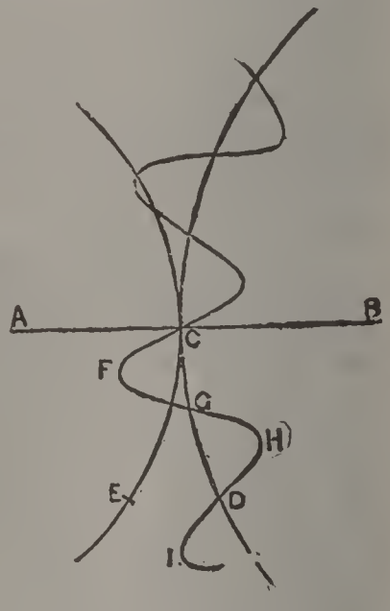


Fig. 2.

obviously, the proper outline for the wheel A; and thus it appears that, whatever outline, within reasonable limits, may have been assumed for the teeth of B, it is always possible, by a geometrical operation, to discover the proper corresponding form for the teeth of A. These forms may be called *conjugate* to each other, inasmuch as that, if the disk A were now cut out and used as B has been, the identical form of B would be reproduced.

We may obtain a whole series of wheels, A′, A″, A‴, etc., from the same original B; and from A, as an original, we may obtain another series, B′, B″, B‴, etc., having various numbers of teeth. And it has been shown that any wheel of the series A will work accurately with any one of the series B. So far well; but then the wheel A of 20 teeth may not be like the wheel B of the same number of teeth. It becomes, therefore, a desideratum to choose the form of the teeth of B in such a manner that its conjugate of the same number of teeth may have the same form; by such an arrangement, we shall obtain a series of wheels, any one of which will work with any other.

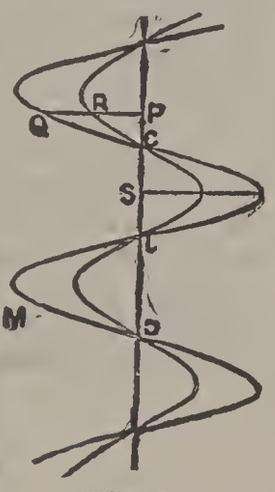


Fig. 3.

If the number of the teeth of B be augmented indefinitely, the outline of the pitch-line will become nearly straight; and so drawing through C (fig. 3) a straight line to touch the pitch-line of A, we shall have the pitch-line of the straight rack, as it is called, which could be worked by any wheel of the series A. The reverse of this rack would work with any one of the series B; therefore, if the series A and B be identical with each other, the rackm ust be its own reverse. Thus we obtain a very important general result—viz., that if we mark off along a straight line distances, CD, equal to the desired interval between the teeth, and then draw any line CKLMD, consisting of four equal parts, CK, KL, LM, MD, symmetrically arranged, all the wheels obtained from this, as the original, will work into each other; moreover, the forms thus obtained answer for internal as well as external teeth.

Being then at liberty to choose any line whatever, subject to the above condition of symmetry, for the figure of the straight rack, we may inquire whether it may not be arranged so as to bring about other desiderata. This line, it may be noted, is not necessarily curved; it may be composed of straight lines, or partly of straight and partly of curved lines.

The general appearance of this wavy line recalls that curve known as the curve of sines, which, indeed, is the simplest known curve, consisting of equal and symmetric undulations, and unlimited in extent. By changing the ordinates in any ratio, say in the ratio of PQ to PR, the waves of the curve may be made shallower or deeper; and on studying the effects of such a change, we discover

some new and very important laws concerning the contacts of the teeth of wheels.

Beginning with the curve of sines *proper*, in which the greatest ordinate, SK, is equal to the radius of a circle of which CD is the length of the circumference, it is found that wheels traced from it can touch each other at only *one* point: of course such wheels cannot work, because the solitary contact is now on the back and now on the front of the tooth. In this case the contour of the tooth crosses the pitch-line at an angle of 45°. On deepening the teeth, still keeping to the same kind of curve, it is found that the wheels begin to touch at more points than one; and when they are made so deep as that the contour crosses the

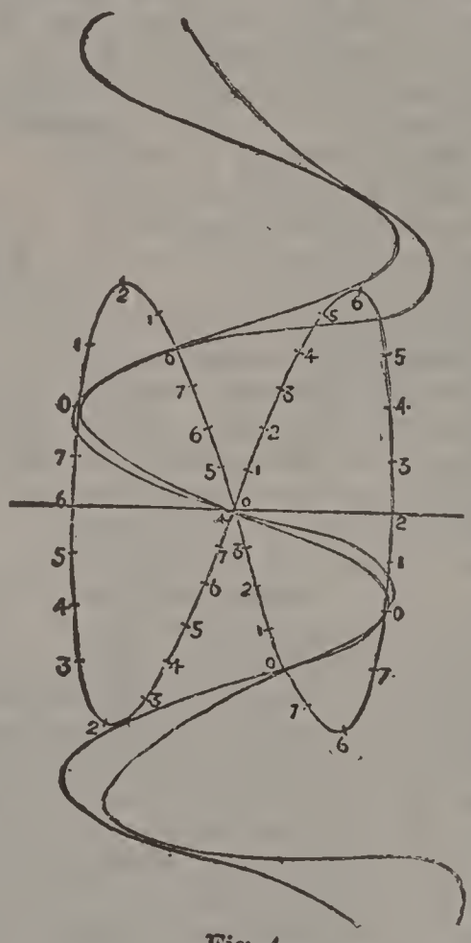


Fig. 4.

pitch-line at an angle of 65°, there are always three contacts, neither more nor less. If the teeth be still further deepened, the contacts become more numerous; they appear and disappear in pairs, so that with an inclination of, say, 68°, there would be sometimes three and sometimes five contacts. When it becomes 70° 17′, there are always five; and with an inclination of 73° 11′, there are always seven points in contact at once.

Of these points of contact, some are on the sides of the teeth, and others are near the top and bottom: the latter, on account of the obliquity of their action, are of no use in driving; they may be called supplementary, and their number is always one less than the number of useful or working contacts. In the system of seven contacts, four

are useful, two of them being forward, and two backward, so that two teeth are always in action at once—an arrangement by which a gradual improvement in the equality of the teeth is secured by their wearing.

When two properly formed wheels are put into motion, the points of contact move also, and describe a peculiarly shaped line, the nature of which depends on the character of the primary form adopted for the tooth of the straight rack. Conversely, if this path of the points of contact be first assumed, and the law of motion in it be observed, the form of the tooth of any wheel may thence be obtained; and this leads us to the most convenient way of making the delineation.

In fig. 4, the form of the straight rack and the corresponding shape of the teeth of a wheel of 20 are shown in contact, the depth of the tooth being such as to give five contacts, which in the drawing are at the five points marked 0. If we suppose the rack to be slid upward, carrying the wheel with it, the points of contact will change; and when the motion has been one-eighth part of the interval between two teeth, these points will occupy the positions marked 1. When a motion of another eighth is made, the two upper contacts on the left hand merge into one, and are about to disappear; at the same instant, two new contacts begin at the lower point, marked 2; and thus the motion continues in the order of the numbers marked along the peculiarly shaped path of the points of contact. Those contacts which occur along the crossing lines of the

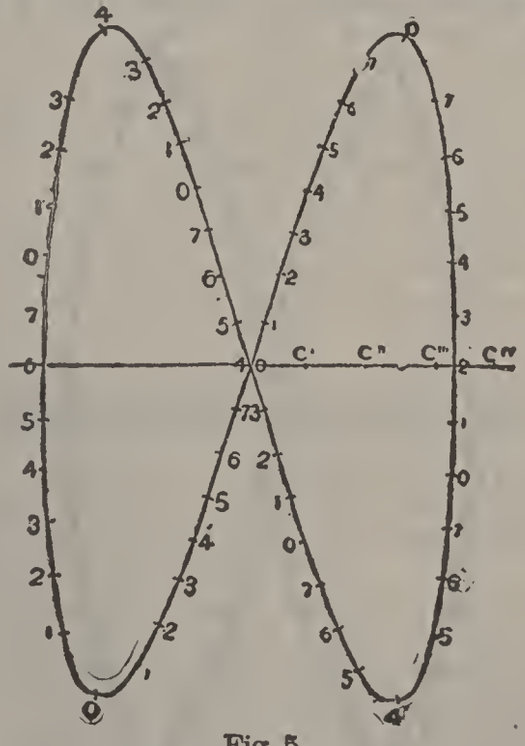


Fig. 5.

curve are working contacts; those which occur along the two external arcs are supplementary. When the form of this path and the positions of the successive points in it have been obtained by calculation, the outline of any wheel is easily traced geometrically. Figs. 5, 6, and 7 show the

path for the system of seven contacts; fig. 5 when the outline of the rack is the curve of sines, fig. 6 when the teeth of the wheels have the involute, and fig. 7 when they have

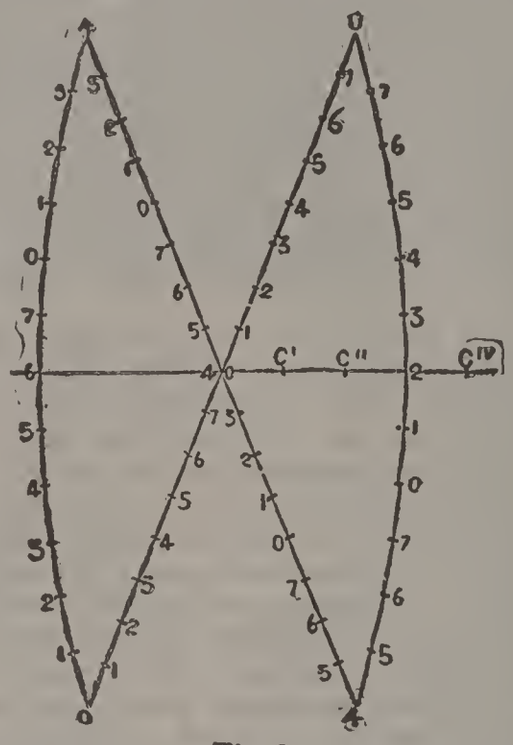


Fig. 6.

the epicycloidal form. In these figures, C', C'', C''' are the positions of the centres of wheels of 1, 2, 3 teeth.

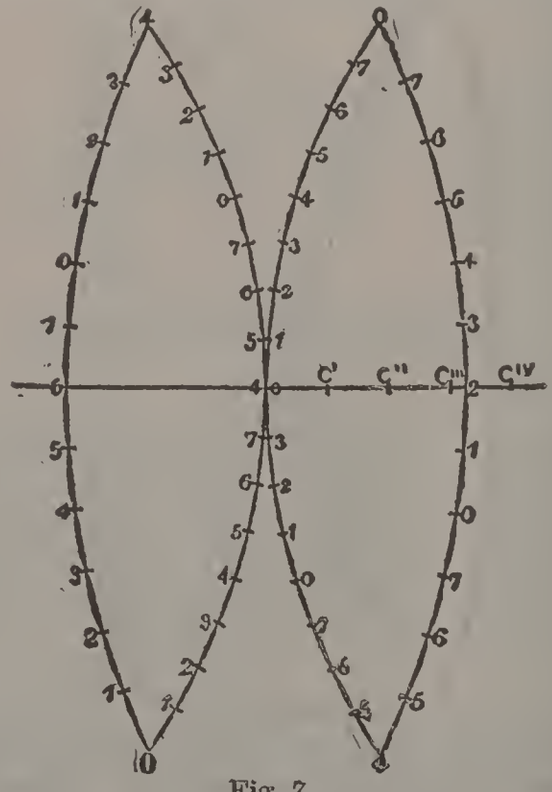


Fig. 7.

In well-constructed machinery there should never be fewer than seven contacts in the system, since of these only four are working; and therefore only two teeth are

fully engaged; and it is necessary that two teeth be engaged at once, in order that the wearing may tend to remove any unavoidable inequalities of workmanship.

When we attempt to delineate the forms of wheels with few teeth by help of any of these orbits, we find that the contours overlap each other; in such cases the following tooth of the conjugate wheel effaces, as it were, the trace belonging to the preceding tooth; and the contacts, though still holding good of the geometrical curves, become mechanically impossible. Thus it is that there are limits below which we cannot go in the numbers of the teeth. If the overlapping occur at the shoulder of the tooth, some of the useful contacts are lacking; but when the replication is only at the point of the tooth, the want of the supplementary contact occasions no inconvenience. An examination of the different cases shows that with several contacts the smallest numbers which can be used on the three systems just mentioned are 19, 17, and 11, so that the system of epicycloidal teeth has, in this respect, the advantage over the others. Clock pinions, then, should not have fewer than eleven leaves.—See *A New General Theory of the Teeth of Wheels* (Edinburgh 1852).

It remains to cut the actual wheels to the shapes thus formed. The essentials of the operation are these: The blank wheel is attached to the axis of a large divided circle, which can be turned round and held in any desired position. A cutter, generally a revolving cutter, is brought down on the blank, so as to notch out the space between two teeth; this done, the circle is turned round by the proper number of divisions, and another space is cut; and in this way the whole circumference of the wheel is gone over. In order that the work be well done, it is essential that the cutter be truly shaped; and when the edges become blunted by use, it is difficult to avoid spoiling the shape in the resharpening. Whatever system be followed, the form of the tooth varies from one number to another, so that the cutter which answers for a wheel of 20 cannot suit one of 30 teeth; hence, when accurate results are wanted, there must be a cutter for each wheel. In order to avoid the expense of so many cutters, each requiring to be carefully made, the slovenly practice is often followed of having, perhaps, two cutters, one to be used for pinions, the other for wheels; and the result is the intolerable noise so common in mills, and which indicates unnecessary expenditure of power.

When, as in the wholesale manufacture of clocks and watches, multitudes of wheels are to be cut of one size, careful attention can be given to the shape of the cutter. The labor is economized by binding a considerable number of blanks together on the dividing-engine, and plowing out the teeth of the whole of them at once. For the small wheels, technically called pinions, which cannot conveniently be fixed on the dividing-engine, *pinion-wires* are used; these are wires of brass or steel drawn through holes of the proper shape, and having the leaves running all along them. The watch-maker removes the leaves from those parts

where they are not wanted, and thus obtains the pinion and its axle in one piece; in this way he gains the advantages of solidity and economy of workmanship.

Among the many purposes to which wheel-work is applied, it happens sometimes that an unequable motion is wanted. Thus, in the construction of an orrery, it is desirable that while one index turns uniformly to show the time, another may turn so as to show the unequal motion of the sun in the ecliptic. In that case the variations of the velocity are small, and it is enough to divide the teeth unequally, as the slight inequality can hardly affect the working of the apparatus. But when the changes of velocity are considerable, the matter must be more carefully considered. If we suppose the pitch-lines of two wheels to be uneven, and to roll on each other without regard to the positions of their centres, the forms of teeth to be arranged on those pitch-lines may be traced out almost in the manner above explained for round wheels. The pitch-line must be divided into equal distances, and the disk must receive a half-sliding, half-turning motion, so that the pitch-line may pass through the point C (fig. 8) always perpendicularly to the line AB, which is the line of centres for round wheels. The combination of this motion with the proper motion of the points of contact gives true forms for the teeth.

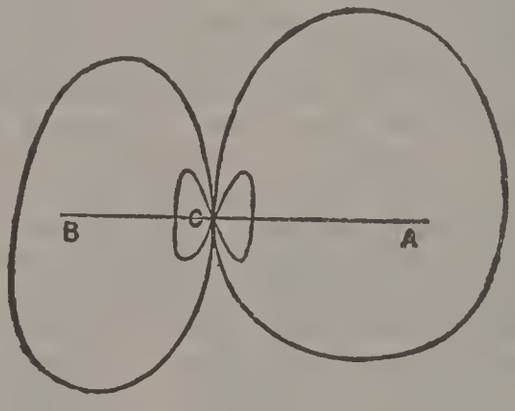


Fig. 8.

Thus the form of the tooth can be obtained when that of the pitch-line is known. Now, when two disks, turning on fixed centres, touch each other at any point out of the straight line joining these centres, there is a slipping of one surface over the other; therefore, in order that the pitch-lines may roll together, they must be so shaped that the point of contact may be in the line of centres. It can be shown that, for any assumed contour of the wheel A, another contour, having its centre at B, and rolling on A, is possible. But, except in one or two special cases, the working out of the problem has not been accomplished. It is enough here to mention the single case of elliptic wheels. The action of these is founded on the well-known property of the ellipse, that the sum of the distances of any point in it from the two foci is constant, and that the curve makes equal angles with these two lines. Hence two equal ellipses turning on their foci, when their centres are at a

distance equal to the major axis of the ellipse, will roll on each other; and teeth formed on these as pitch-lines will work perfectly. In fig 9, the ellipses have their major and minor axes in the proportion of 5 to 4; with that proportion the focus is at one-fifth part of the major axis from

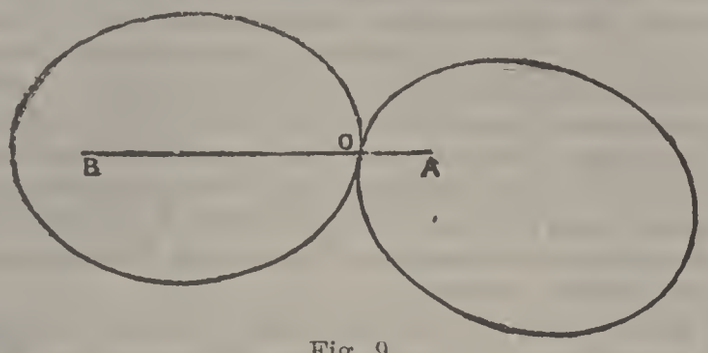


Fig. 9.

one end; therefore B, at one part of the revolution, moves four times as rapidly—at another part, four times as slowly—as A.

Sometimes one of the wheels has to be quite at rest during part of the motion of the other wheel. This is accomplished by causing some part of the wheel that is to be stationary, to bear on a part of the circumference of the moving-wheel which is concentric with its axis. This is exemplified in the arrangement for counting wheels in fig. 10. The object of this apparatus is to count and record the revolutions of the wheel B. As this wheel turns round, a pin E attached to it enters into the slit GH, and thus carries the wheel A round as long as the pin remains in the slit—that is, until the slit GH be brought into the position IK. As soon as E leaves the slit at I, there would be no further connection between the two wheels, and A could be moved altogether independently of B. In order to prevent this, the disk B is made nearly five-sixths entire, and parts of A are scooped out between the slits so as to receive and to fit B. By this means A is prevented from being turned either forward or backward until the pin E again come into one of the slits. When this happens, the projecting part at G finds room in the recess F. If there be seven slits, GH, round the wheel A, and if B turn once in 24 hours, an index attached to A would show the days of the week: and the index might be made to be stationary all day, the change being effected during the night. An example of this kind of interrupted motion is seen in the ordinary dead-beat clock escapement, in which the detaining surface of the pallet is concentric with the axis of the crutch.

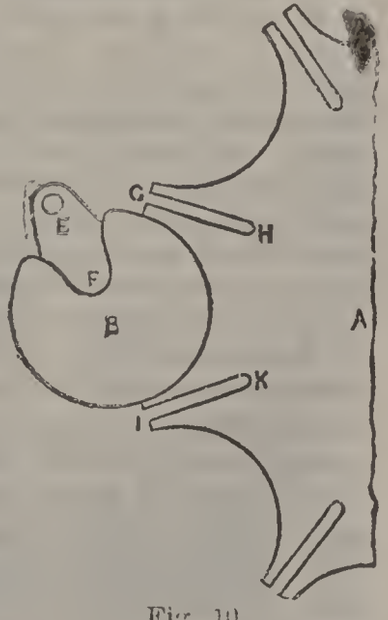


Fig. 10.

When the axes are inclined to each other, *bevelled* wheels

are used. Just as common wheels may be regarded as fluted cylinders, bevelled wheels may be described as fluted cones having a common apex. The principles which regulate the formation of the teeth of these are the same as for plane wheels; but the application of these principles is considerably more intricate. Since both the teeth and the spaces between them are tapered, it is impossible to notch out the intervals by means of a revolving cutter. Attempts have been made to construct machinery for planing the teeth by means of a cutter moving in a line toward the apex of the cone; but the complexity of the apparatus, and the slowness of the process, have prevented its introduction: thus the accurate formation of bevelled wheels has still to be accomplished by hand.

WHEELWRIGHT, *hwēl'rīt,* JOHN: colonial Congl. minister: 1594–1679, Nov. 15; b. in Lincolnshire, England. After graduation at Cambridge, he ministered in the Established Church at Alford until 1636, when he was expelled by Abp. Laud, and, emigrating to New England, was pastor in Braintree, Mass. Sympathizing with the opinions of his sister-in-law, Anne Hutchinson (q.v.), he came into a conflict with the associate pastor of the Boston church (of which his was a branch), and he was banished from the colony on an ill-founded charge of seditious preaching. In 1638 he founded the town of Exeter, N. H.; and when that was claimed as within the bounds of the colony, he removed to Wells, Me. In 1644 he was readmitted to the colony, and lived in Hampton, N. H., visiting England 1657–60, after which he was pastor in Salisbury, N. H., where he died. He published a vindication 1654.

WHEEL'WRIGHT, WILLIAM: promoter of Central and S. American enterprises: 1798–1873, Sep. 26; b. Newburyport, Mass.; descendant of the Rev. John W. At the age of 19 he commanded a vessel sailing to Rio Janeiro, and at 26 was U. S. consul at Guayaquil. Five years later he began to establish lines of steamers on the w. coast of S. America, resulting in the formation of the Pacific Steam Navigation Company; and his enterprises included coal mines, railroads, and the first telegraphs and gas and water works in S. America. He gave largely to benevolence, and at his death in London left $100,000 for a scientific school in Newburyport. A bronze statue was erected to his memory in Valparaiso. He published a book on his steamship enterprise 1838, and *Observations on the Isthmus of Panama* (1844).—His life (in Spanish by Alberdi) was transl., Boston, 1877; also sketched by John Codman 1888.

WHEEN, n. *hwēn* [AS. *hwæne,* somewhat]: in *Scot.,* a number, as a *wheen* of children; a *wheen* of potatoes.

WHEEZE, v. *hwēz* [AS. *hwesan,* to breathe with difficulty: Icel. *hvæsa;* Dan *hvæse,* to wheeze, to hiss]: to breathe with difficulty and with an audible sound. WHEEZ'ING, imp.: N. the act of breathing hard with noise, produced by obstruction of the air-passages; the noise made by such breathing. WHEEZED, pp. *hwēzd.* WHEEZ'Y a. *-i,* breathing audibly and with difficulty.

WHELK, n. *hwĕlk* [AS. *weoic*, a whelk, a shell-fish]: a shell-fish; a small spiral-shaped univalve; gasteropodous mollusk of the genus *Buccinum*, family *Buccinidæ*. The shell is ovate, turreted, and more or less ventricose; its mouth ovate, emarginate, or produced into a very short canal below, outer lip expanded, inner lip usually thin and smooth within. The operculum is horny. The animal has a broad head, with two tentacula, with whose base the stalks bearing the eyes are united; the proboscis is large, and the tongue armed with teeth, used for rasping substances used for food—almost any animal substance being welcome for this use—or for perforating the shells of other mollusks in order to prey upon them. There are about 20 known species, found chiefly on the coasts of colder parts of the world. The commonest species on our coast is *B. obsoletum*, abundant on tide-flats; it averages 1 in. in length, is brown in color, often covered with black slime, and the animal is a good scavenger in its feeding. Another common species is *B. trivittatum*, greenish white, often with three bands on the largest whorl. The COMMON W., or BUCKIE (*B. undatum*), is found on both sides of the Atlantic; and at Cape Ann, Mass., is called Periwinkle, a name applied also to two larger shells on our eastern coast, *Fulgur* and *Sycotypus*. It occurs from low-water mark to a depth of 100 fathoms, is sometimes three inches in length, grayish or brownish white, with numerous raised ridges and spiral

Whelk (*Buccinum undatum*): *a*, the eggs.

striæ. It is much used as food, is cooked simply by boiling, and eaten usually with vinegar and pepper. Great quantities are consumed in London, chiefly by the poorer classes. In former times, whelks appear to have been more esteemed for food than now. Eight thousand of them were provided for the enthronization feast of William Warham, Abp. of Canterbury, 1504. The whelks brought to the London market are obtained mostly by dredging. On the coast of Galloway, where they are used as bait for cod, they are procured by letting down baskets containing pieces of fish in about ten fathoms water: the baskets, taken up next day, contain many whelks, which have crept into them to feed on the garbage.—The name W. (or *Wilk*) is popularly given in Scotland to the Periwinkle (q.v.), the W. being known by that of *Buckie*.—There are more than 100 fossil species of W. in the Miocene formations.

WHELK, n. *hwĕlk* [from WHEAL 1, which see]: a pimple. WHELKED, a. *hwĕlkt*, covered with pimples.—*Whelk* or *Bubucle* is the name used by old writers for the cutaneous disorder now commonly known as *Acne* (q.v.). The simple whelk, the black whelk, the inveterate whelk, and the crimson whelk correspond to *Acne simplex*, *A. punctata*, *A. indurata*, and *A. rosacea* of the more modern dermatologists. The symptoms of the crimson whelk, or fiery-face, must have been carefully observed by Shakespeare before he could have written Fluellen's graphic description of Bardolph: 'His face is all bubukles, and whelks, and knobs, and flames of fire, but his lips plows at his nose; and it is like a coal of fire, sometimes plue, and sometimes red.'—*King Henry V.*, act iii. sc. vi. The *Chin-whelk* is now known as *Sycosis* or *Mentagra*.

WHELM, v. *hwĕlm* [*whelm* and *overwhelm* are probably the same as OE. *whelven* and *overwhelven*, used almost in same sense: Sw. *hwalm*, a hay-cock, connected with *hwalf*, an arch—*whelm* thus meaning, originally, to arch over, hence, to overturn]: to cover with water or other fluid; to immerse deeply; to overburden; to plunge in utter destruction. WHELM'ING, imp. WHELMED, pp. *hwĕlmd*.

WHELP, n. *hwĕlp* [Icel. *hvelpr;* Dut. *welp;* MHG. *welf*, the young of dogs, lions, bears, etc.]: the young of a dog, a lion, a fox, etc.; a puppy; a young man or youth, in contempt: V. to bring forth young, as a bitch, etc. WHELP'ING, imp.: N. the act of bringing forth young. WHELPED, pp. *hwĕlpt*. WHELPS, n. plu. short upright pieces around the barrel of a capstan to give resting-points for the messenger or hawser.

WHEN, ad. *hwĕn* [AS. *hwænne;* Ger. *wann*, *wenn;* Goth. *hvan*, when]: at what time; at the time that; though at the same time; which time: CONJ. while; whereas. WHEN'AS, in *OE.*, at the time when; what time. WHEN-EV'ER, ad. *-ĕv'ĕr*, at whatever time; also WHEN'SOEV'ER, ad. *-sō-ĕv'ĕr*, at what time soever.

WHENCE, ad. *hwĕns* [OE. *whennes;* AS. *hwanon*, whence: Ger. *wannen*]: from what place; from what or which source or origin; how. WHENCE'SOEV'ER, ad. *-sō-ĕv'ĕr*, from what place, cause, or source soever. FROM WHENCE, a common phrase for WHENCE.

WHERE, ad. *hwär* [AS. *hwar*, *hwær;* Icel. and Goth. *hvar;* Dan. *hvor;* Dut. *waar*, where]: at what place; in what situation; at the place in which; to what or which place; in *OE.*, whence; also used as a conjunction, whereas. ANYWHERE, at any place. WHERE'ABOUT, ad. near what or which place; with reference to which. WHERE-ABOUT, or WHERE'ABOUTS, n. place where some one or something is to be found or sought for; lodging; place of residence. WHEREAS', conj. when in fact or truth; the thing being so that; while on the contrary; in *OE.*, at which place. WHEREAT', ad. at which; at what. WHERE-BY', ad. by means of which; by what. WHERE'FORE, ad. and conj. for which reason; why. WHEREIN', ad. in which; in what. WHERE'INTO', ad. into which. WHEREOF', ad.

of which; of what. WHEREON′, ad. on which. WHERE′SOEV′ER, ad. in what place soever. WHERE′THROUGH, ad. in *OE.*, through or on account of which. WHERETO′, ad. to which. WHERE′UNTO′, ad. to which; to what. WHERE′UPON′, ad. upon which. WHEREV′ER, ad. at whatever place. WHEREWITH′, ad. with which; with what; also WHERE′WITHAL′, ad.

WHERRY, n. *hwĕr′rĭ* [perhaps Gael, *curach;* W. *cwrwgh,* a wherry, a skiff]: a light row-boat, sharp at each end for speed; a ferry-boat; a small half-decked fishing-vessel. WHER′RYMAN, n. the rower of a wherry.

WHERRY, *hwĕr′ĭ,* WILLIAM MACKY: American soldier: b. St. Louis, Mo., 1836, Sept. 13. He was educated at the University of Missouri and studied law; served through the civil war; and was present at the battles of Wilson's Creek, Dallas, Kenesaw Mountain, Atlanta, Jonesboro, Nashville, and at the surrender of Gen. J. E. Johnson. He was brevetted brigadier-general of volunteers in 1865, mustered out of the volunteer service in 1866, and appointed captain in the regular army and subsequently served on frontier duty. In the war with Spain in 1898 he took part in the battle of San Juan Hill, and in the capture of Santiago. He was promoted brigadier-general United States army 1899, Jan. 7, and was retired the same month. He has published *Battles and Leaders of the Civil War* (1888-9); etc.

WHET, v. *hwĕt* [AS. *hwæt;* Icel. *hvatr,* sharp: Ger. *wetzen;* Dut. *wetten,* to whet, to sharpen]: to sharpen, as a razor, a knife, sickle, or the like, by rubbing or by friction on a stone or some other suitable substance; to excite or stimulate, as the appetite; to make keen; in *OE.,* to make angry or acrimonious: N. the act of sharpening by friction; something that whets or stimulates. WHET′TING, imp. WHET′TED, pp. WHET′TER, n. *-tẽr,* one who or that which whets; in *OE.,* one who tipples. WHETSTONE, any hard fine-grained stone used for sharpening knives, etc.; a hone (see HONES). WHETSLATE, a variety of slate used for whetting.

WHETHER, conj. *hwĕth′ẽr* [Goth. *hvathar;* AS. *hwæther,* which of two: AS. *hwá,* who]: a word used to introduce the first of two or more alternative clauses, the second being introduced by *or,* as, resolve *whether* you will or not; sometimes the second alternative clause is omitted, as, I do not know *whether* he has come (or not): PRON. in *OE.,* which of two—used interrogatively and relatively.

WHEW, interj. *hwū:* a sound expressing astonishment, aversion, or contempt.

WHEWELL, *hū′ĕl,* WILLIAM, D.D.: 1795-1866; b. Lancaster, England. He entered at Trinity College, Cambridge, and graduated (second wrangler and second Smith's prize-man) B.A. 1816. He became a fellow and afterward a tutor of Trinity, where also, for many years,

he acted as a 'coach,' or private tutor. In 1820 he became a fellow of the Royal Society; was professor of mineralogy in Cambridge 1828-32; professor of moral theology, or casuistry, 1838-55. In 1841 he was appointed master of Trinity; in the same year he was president of the British Association; also for a time president of the Geological Society. In 1855 he became vice-chancellor of the University of Cambridge.

Whewell produced several text-books on mathematical subjects; one of which, *Dynamics* (1823), is still deservedly admired. He contributed a variety of papers to the Transactions of learned and scientific societies, and to scientific journals, and reviews. Later in life he concentrated his powers mainly on large works. Among the most important are: *Astronomy and General Physics Considered in Reference to Natural Theology,* being the third Bridgewater treatise (Lond. 1833); *History of the Inductive Sciences, from the Earliest to the Present Times* (3 vols. Lond. 1837); *The Philosophy of the Inductive Sciences, Founded Upon Their History* (2 vols. Lond. 1840); *The Elements of Morality, Including Polity* (Lond. 1855). Among his other works were translations from the German and the Greek, and many essays. His last composition, so far as known, was an attack on Comte and Positivism, which appeared in *Macmillan's Magazine* after his death.

Whewell's acquisitions were most various. His writings were so various and voluminous that it might be thought sufficient employment of the life of a mere clever book-maker to have produced them. Whewell was neither bookworm nor book-maker. A clear-headed student, he was always increasing his stock of knowledge; a vigorous and independent thinker and writer, he was always giving forth the results of his studies to the public; and having thus proceeded during a long life of almost uninterrupted good health, he may be taken as illustrating what at the best may be achieved by a man of ambition, ability, and unflagging industry without genius. He was nowise superficial, like many pretenders to encyclopedic knowledge; he was really master of all that could be learned on a great many subjects. His chief ambition was to grasp, survey, and co-ordinate the sciences; and he did excellent service both to science and history in the effort to gratify it.

WHEWER, n. *hwū'ėr:* the widgeon.

WHEY, n. *hwā* [AS. *hwæg;* Dut. *wei,* whey: connected with Goth. *vato,* water]: in *cheese-making,* the thin, sweet, watery part of the milk remaining after the separation of the curd; the serum of milk. WHEY'EY, a. *-ĭ,* or WHEY'-ISH, a. *-ĭsh,* resembling whey; white; thin.—*Whey* is the straw-colored fluid which remains on the surface when the casein of milk has been coagulated by addition of some coagulating substance and falls in flakes and clots to the bottom. Cheese-making affords the principal source of

whey, which, thus obtained, forms, like buttermilk, a valuable kind of drink. The whey of goat's milk is regarded as specially beneficial, and in Switzerland and elsewhere are large establishments for applying the *whey-cure,* either alone or in association with the grape-cure. There can be no doubt that, were the cases judiciously selected, much good, in the way of eliminating morbid matter, might be effected in a few weeks by confining the patients to a diet of brown bread, grapes, and whey; while, on the other hand, many diseases might be much aggravated by that treatment. In ordinary medicine are recognized several useful varieties of whey, as white-wine whey, prepared by addition of sufficient sherry to a tumbler of heated milk to coagulate the casein. On decanting off the whey from the curds, and sweetening, a favorite sudorific draught is obtained—taken at bed-time for incipient cold in the head. *Cream-of-tartar whey* and *nitre-whey*—the former prepared by boiling 100 grains of cream of tartar in a pint of milk, and the latter by the similar use of nitre—act in the same way as wine-whey, but more powerfully. For *tamarind whey,* see TAMARIND.

WHICH, rel. and interrogative pron. *hwĭch* [Goth. *hveleiks,* what-like: Dut. *welk;* Fris. *hwelik* or *hwek,* which: AS. *hwilc,* which—from *whí,* why, and *lik,* like]: the so-called neuter of who; an interrogative, equal to 'what one' (of all these), as, *which* do you want? *which* is the house? a word used when referring to something going before (hence called the *antecedent*), as a place, animal, thing, or even a phrase, as, the dog *which* barks; he asked a high price, *which* perhaps was natural: used as an indefinite pronoun, and nearly equivalent to 'any one' (of the whole number or lot), as, take *which* you will. WHICHEV'ER, rel. *-ĕv'ėr,* or WHICH'SOEV'ER, rel. *-sō-ĕv'ėr,* whether one or the other; which.

WHICHCOTE, BENJAMIN: English Anglican clergyman: b. Stoke, Shropshire, 1610, Mar. 11; d. Cambridge 1683, May. He was educated at Emmanuel College, Cambridge, took orders in the English Church in 1636, held the living of North Cadbury, Somerset, in 1643, and the next year was appointed provost of King's College, Cambridge. He was a leader of the latitudinarian school of English divines; a famous preacher, and one of the Cambridge Platonists. His works, published posthumously, include: *Observations and Apophthegms* (1688); *Moral and Religious Aphorisms* (1703); *Sermons* (1698-1707); etc.

WHIFF, n. *hwĭf* [imitative of the sound of blowing, like *puff, huff,* or *fuff:* W. *chwiff,* a whiff; *chwaff,* a quick gust: Dan. *vift,* a puff]: a sudden breath of air or fume, as from the mouth; a slight blast or gust; a puff: V. to throw out in slight puffs of air or fume; to emit with whiffs, as in smoking; to puff. WHIF'FING, imp. WHIFFED, pp. *hwĭft.*

WHIFFLE, v. *hwĭf'fl* [from WHIFF, which see: Dut *weifelen*, to waver, to be inconstant]: to be fickle and unsteady; to veer about: to breathe unsteadily: to blow in gusts; to trifle; in *OE.*, to blow away: N. in *OE.*, a fife or small flute. WHIF'FLING, imp. *-flĭng:* ADJ. moving inconstantly; shifting. WHIFFLED, pp. *hwĭf'fld.* WHIF'FLER, n. *-flĕr*, one who frequently changes his opinions or course: a trifler; in *OE.*, a fifer or piper in front of a company; a harbinger. WHIFFLETREE, the swing-tree or cross-bar to which harness-traces are fastened; a Swingle-tree (q.v.).

WHIG, n. *hwĭg* [AS. *hwæg*, whey: Scot. *whig*, a sour drink prepared from fermented whey—originally applied to the western Covenanters, from their sourness of aspect and demeanor: W. *chwig*, fermented, sour (but see WHIGGAMORE)]: a member of that one of the two great political parties of the United Kingdom now usually styled *liberals* or the *liberal party* (see below); an advocate of such changes in the constitution as tend in the direction of democracy; a moderate liberal. In the United States, in revolutionary times, *whig* was the opposite of *royalist* or *tory*, and denoted one who supported the revolution; in the 19th c. (about 1834–60), one of a nationalizing party who opposed the democrats or states-rights party (see POLITICAL PARTIES in the United States). WHIG, a. pert. to or composed of whigs. WHIG'LING, n. an old contemptuous name for a whig. WHIG'GISH, a. *-gĭsh*, pert. to the whigs or their principles. WHIG'GERY, n. *-gĕr-ĭ*, or WHIG'GISM, n. *-gĭzm*, the principles of whigs, or their conduct. WHIG'GISHLY, ad. *-gĭsh-lĭ.*

WHIGGAMORE, *hwĭg'ga-mōr:* according to Bp. Burnet (in his *Hist. of his Own Times*), one of the company of persons who were accustomed to resort periodically from the s.w. counties of Scotland to the port of Leith to buy grain; so called from the word *whiggam* [perhaps a corruption of *whig on*, jog on—from *whig*, to jog], used by them in driving their horses. The name was extended to the much larger band, 6,000 strong, composed of persons in w. Scotland who were opposed to the court, and who on the defeat of the Duke of Hamilton, under the leadership of their ministers and headed by the Marquis of Argyle, marched to Edinburgh 1648, 'the ministers praying and preaching all the way with an unheard-of fury.' 'This,' says Bp. Burnet, 'was called the *Whiggamor's inroad;* and ever after that all who opposed the court came in contempt to be called *Whiggs.*' Hence, one of the party opposed to the court.

WHIG AND TORY: names which for the last two centuries have been popularly applied to two opposite political parties in Great Britain. Both were at first names of reproach. *Whig* was originally a nickname of the peasantry of the western lowlands of Scotland, said by some to be derived from a word or sound used by them in driving their horses (see WHIGGAMORE); by others, from *whig* (or *whey*), 'an acetous liquor subsiding from sour cream.'—*Jamieson.* Its next application was to the bands of Covenanters, chiefly from w. Scotland, who, subsequently to the

murder of Abp. Sharpe, took up arms against the government, and, after gaining some successes in encounters with the king's troops, were defeated at Bothwell Bridge. Thence the name whig (or whiggamore) came to be fastened, first, on the Presbyterian zealots of Scotland; afterward on those English politicians who showed a disposition to oppose the court and treat Prot. nonconformists with leniency. The word *tory*—said to be derived from *tora, tora*, in Irish, 'give, give,' or 'stand and deliver'—was given first to bands of outlaws, half-robber, half-insurgent, professing the Rom. Cath. faith, who harassed the English in Ireland; and was thence applied reproachfully to all who were supposed to be abettors of the imaginary Popish Plot; and then generally to persons who refused to concur in the exclusion of a Rom. Cath. prince from the throne. These two nicknames, whig and tory, which came into use about 1680, immediately became familiar words, and have been retained as designations of two opposite political sides—the tories being, in general, the adherents of the ancient constitution without change, and the supporters of regal, ecclesiastical, and aristocratic authority; while the whigs have been the advocates of such changes in the constitution as tend in the direction of democracy. The most sweeping constitutional change of the 19th c. which the whigs have carried is the Reform Bill of 1832 (see REFORM, PARLIAMENTARY). Each party, while preserving within certain limits a general consistency of purpose, has undergone many changes in principles, professions, and modes of action; and among persons who have been considered adherents of each side at any given time, there have seldom been lacking a variety of distinctive shades of opinion. A division in the ranks of either party has often led the more moderate section of that party to coalesce with the opposite side; and at other times, the extreme party of innovation, dropping their connection with the whigs, have adopted another name, as when those politicians whose desire was to have the whole national system remodelled on a democratic basis assumed the designation *radical reformers* or *radicals*. See CHARTISM. For a considerable time after the Reform Bill, the governing section of the whig party were disposed more to maintain the principles of the changes already made, than to insist on further constitutional changes; and the principles maintained by whigs and tories sometimes approximated so closely that the difference seemed rather of men than of measures. Sometimes one party, sometimes the other, has appeared as the advocate of measures which have proved beneficial. In the agitation for the repeal of the Corn Laws, 1841–46, the tories were ranked on the side of protection, and the whigs on the side of free trade; but the relations of the two parties had been the reverse at a former period, when Pitt's advocacy of free trade between England and Ireland was opposed by the manufacturers of Lancashire, who succeeded in postponing his measure. Since about the middle of the 19th c. or earlier, the names *liberal* and *conservative* have almost entirely superseded the former

party designations of whig and tory: the beginning of this change of names was about 1830–32, when the more aristocratic and conservative whigs, who had long been dismayed at the atrocities of the French Revolution, more decisively separated themselves from the advanced reformers; while the latter in consequence conceiving a disgust at the name of whig, took the continental designation 'liberals.' In recent years a section of the former liberals, who have acted in great measure with the conservatives, have been known as liberal unionists.

WHILE, conj. *hwīl* [Goth. *hveila*, hour, time: Icel. *hvila*, a place of rest: Dan. *hvile;* Sw. *hvila*, rest: Ger. *weile*, time, leisure]: during the time that: as long as; at the same time that; in *OE.* and *Scot.*, until: N. space of time; continued duration; pains or time, as in 'worth *while:*' V. to cause to pass pleasantly, as time; to loiter. WHIL'ING, imp. WHILED, pp. *hwīld.* WHILES, conj. or ad. *hwīlz*, in *OE.*, while; as long as; in *Scot.*, sometimes, as, *whiles* I'm homesick, *whiles* I'm no. WHILST, conj. *hwīlst*, same as *while.* WHILERE, ad. *hwīl-ār'* or *-ār'*, in *OE.*, a little while ago; erewhile. TO WHILE AWAY THE TIME, to pass time idly but pleasantly.

WHILK, a. *hwĭlk* [Icel. *hvílíkr*]: in *Scot.* and *OE.*, which.

WHILK, n. *hwĭlk:* same as WHELK, a Shell-fish.

WHILOM, ad. *hwī'lŭm* [AS. *hwilum*, at times]: in *OE.*, formerly; once; long ago.

WHILST: see WHILE.

WHIM, n. *hwĭm* [Icel. *hvima*, to wander with the eyes: Norw. *kvima*, to play the fool: Dan. *vimse*, to skip to and fro: Icel. *vim*, giddiness, folly]: a capricious fancy or conceit; a freakish humor: V. in *OE.*, to be full of, or indulge in, whims. WHIM'SEY, n. *-zĭ*, a whim; a freak. WHIM'SICAL, a. *-kal*, full of whims or odd fancies; capricious; freakish; odd. WHIM'SICALLY, ad. *-lĭ.* WHIM'SICALNESS, n. *-nĕs*, or WHIM'SICAL'ITY, n. *-kăl'ĭ-tĭ*, the state or quality of being whimsical. WHIM'MY, a. *-mĭ*, whimsical; capricious.—SYN. of 'whim': caprice; humor; freak; fancy; changeableness; fickleness; variableness.

WHIM, n. *hwĭm* [Bav. *wimmen*, to stir: Dut. *wemelen*, to vibrate, to drive round]: a drum or capstan worked by horses or oxen for winding ore or coals out of a mine or in other similar ways.

WHIMBREL, n. *hwĭm'brĕl* [perhaps connected with *whimper*, from its cry]: a bird (*Numenius phæopus*) of the same genus with the Curlew (q.v.), and much resembling it in form, plumage, and habits, but smaller, and with bill considerably shorter in proportion. The female, which is larger than the male, is about 18 in. in length, the bill being about 3½ in. The plumage of the W. is of bright ash-color, with streaks of brown on the neck and breast. The W. is a very widely distributed bird, being found from n. Africa and n. India to the arctic regions of Europe and Asia: it occurs also in Japan. It is a bird of passage, and visits Great Britain chiefly in its spring and autumn migra-

sions. The eggs are deemed a delicacy, and the flesh also is prized for food.

Whimbrel (*Numenius phœopus*).

WHIMPER, v. *hwĭm'pĕr* [Ger. *wimmern*, to cry in a subdued way: from same root as *whine*, which see]: to cry with a low, whining, broken voice, as a child; to express grief in a whining tone: N. a low, broken cry. WHIM'PERING, imp.: N. a low, muttering cry. WHIM'PERED, pp. *-pĕrd*. WHIM'PERER, n. *-pĕr-ĕr*, one who whimpers.

WHIM'SEY, WHIM'SICAL, etc.: see WHIM 1.

WHIN, n. *hwĭn* [W. *chwyn*, weeds]: a wild prickly bush producing in early spring abundance of yellow flowers, the *Ulex Europæus*, ord. *Leguminōsæ;* gorse; FURZE (q.v.). WHIN'NY, a. *-nĭ*, abounding in whin-bushes. WHIN-CHAT, n. a bird (*Saxicola rubetra*) very similar to the Stone-chat (q.v.), a summer visitant of Great Britain and of n. Europe. It is widely diffused over the Brit. Islands in summer, but nowhere very abundant. The head, sides of the neck, and upper parts of the body are blackish brown, each feather bordered with rusty yellow; an elongated streak of white above each eye; throat and a streak on each side of the neck white; breast rust-color; large white spot on each wing; tail white, except the two middle quills and the tip, which are blackish brown. The colors of the female are less distinct than those of the male. The W. frequents furze (or whin) bushes (hence the name), and nests on the ground. Its song is pleasant.

WHIN, or WHINSTONE, n. *hwĭn* [Scot. *quhyn*, greenstone: Icel. *hwin*, resounding]: *literally*, the resounding-stone; in *Scotland*, any hard and compact stone, as distinguished from sandstone or freestone, and from rocks of slaty structure. Thus, in most parts of Scotland, it is the common appellation of basalt, greenstone, and other trap-rocks, and in some districts of granite.

WHINE, v. *hwīn* [Goth. *quainon;* Ger. *weinen;* Icel. *kveina*, to weep, to lament: Dan. *hvine;* Sw. *hvina*, to whistle: W. *cwyno*, to bewail]: to utter in plaintive drawling tones or cries; to complain in a mean or unmanly way;

to make a plaintive cry, as some animals: N. a drawling plaintive tone of voice; mean or affected complaint. WHIN'ING, imp. WHINED, pp. *hwīnd.* WHIN'INGLY, ad. *-li.* WHIN'ER, n. *-ėr*, one who whines.

WHINGE, v. *hwinj* [see WHINE]: in *Scot.*, to whine; to sob. WHINGING, imp. *hwĭnj'ing.* WHINGED, pp. *hwĭnjd.*

WHINGER, n. *hwing'ėr:* in *Scot.*, a weapon for secret deeds; a short hanger or sword used at meals and in brawls: also spelled WHINYARD. *Note.*—An older spelling is *whiniard*, formed after the same model as *poniard.* The spelling *whinyard* arose from the desire to account for the origin of the word—that is, the weapon whose blade is supposed to be a *yard* in length: *hanger* is another spelling, in allusion to its handy character as a weapon that can be conveniently suspended.

WHINNY, v. *hwĭn'nĭ* [imitative of the sound—allied to Eng. *whine:* comp. L. *hinnīrė*, to neigh]: to neigh or cry like a mare: N. the cry of a mare. WHIN'NYING, imp.: N. the cry of a mare. WHIN'NIED, pp. *-nĭd.*

WHIN NY: see WHIN 1.

WHIN STONE: see WHIN 2.

WHIN YARD: see WHINGER.

WHIP, n. *hwĭp* [O. Dut. *wippe*, a whip: Dan. *vippe* to rock, to wag: Icel. *hvipp*, a quick movement; *svipa*, to whip: comp. Gael. *cuip*, a whip: W. *chwip*, a quick turn]: a lash of plaited cords or the like tied to a handle, especially used in driving horses, etc.; hence, one who drives; a driver, as, 'a wretched *whip*,' a bad coachman: also a name applied to a member of a political party in the Brit. parliament, specially charged with the duty of bringing the members of his party together on all important questions before the house; the summons issued to members of a party by its leaders to be in their places at a particular time in order to support some particular measure with their votes: a small lift-purchase made by a rope rove through a single block and then through a snatch-block, and worked by a horse or horses which walk away from the thing hoisted—sometimes called *whip-and-derry;* a tied up flag used for signalling: V. to strike or beat with a quick motion; to strike with a lash or anything flexible; to correct with lashes; to drive with lashes; to beat into froth, as cream: in *sewing*, to overedge or overcast; to wind closely round and round with cord, thread, or the like, as to *whip* a spliced shaft with strong cord; to enwrap: to seize (in its nautical sense): to lash with sarcasm; to take anything nimbly, out, up, or away; to move nimbly; to start suddenly. WHIP'PING, imp.: N. the act of punishing with a lash; the state of being corrected with a whip: in *sewing*, overcasting. WHIPPED, pp., or WHIPT, pp. *hwĭpt.* WHIPPER-IN, *hwĭp'pėr-in*, among *huntsmen*, one who keeps the hounds from wandering; a parliamentary whip. WHIP'PER, n. *-pėr*, one who whips; a porter who raises coal from a ship's hold by means of a tackle. WHIP-CORD, cord of which the ends of lashes are made. WHIP'-HAND, the hand that holds the

whip in riding or driving; the right hand; an advantage or advantageous position. WHIP'LASH, the lash or striking part of a whip. WHIP'SAW, a large saw set in a frame for dividing large timber lengthwise. WHIP'STAFF, in a *ship*, a bar by which the rudder is turned. WHIP'STER, n. *-stĕr*, a nimble fellow; a whipper-snapper. WHIP STOCK, n. *-stŏk*, the handle of a whip. WHIP'PING-POST, a post to which offenders are tied when punished by whipping. To WHIP ABOUT or ROUND, to wrap. To WHIP OUT, to draw out nimbly; to snatch. To WHIP FROM, to take away suddenly. To WHIP UP, to seize or take up with quick motion. WITH WHIP AND SPUR, with the utmost haste. To HAVE THE WHIP'-HAND OF, to possess the advantage over. WHIP'PER-SNAP'PER, an insignificant and diminutive person.

WHIP'PING: infliction of stripes as a punishment; formerly often awarded by the criminal law of England for minor offenses, such as petty larceny, and frequently superadded to some other punishment, such as imprisonment or the pillory. In early times, and by the usage of the Star Chamber, whipping was not to be inflicted on a gentleman. —In Scotland, also, sentence of whipping was frequent, the terms of the sentence sometimes requiring it to be repeated at intervals and in different parts of the kingdom. In the 18th c. the Scottish burgh magistrates were in the habit of awarding sentence of whipping on summary convictions for police offenses, such as broils, street outrages, and keeping of disorderly houses; but in modern practice the competency of inflicting this sentence at common law without intervention of a jury has been brought into question. Whipping was not long ago an occasional addition to the sentence of the justiciary court on persons convicted of aggravated assaults.

The infliction of corporal punishment by whipping on women was prohibited by Act 1 Geo. IV. c. 57. Recent legislation in England and Scotland has made various provisions for infliction of whipping on juvenile culprits; and Act 26 and 27 Vict. c. 44 provides for this punishment in England of adults also, convicted of a certain class of crimes. It is a general impression among Eng. magistrates that whipping to the moderate extent allowed by 26 and 27 Vict. has had a most salutary effect in repressing certain kinds of outrage; the fear of mere imprisonment, or even of penal servitude, having little efficacy in the way of prevention.

In the United States, as far as the general govt. is concerned, W. was abolished (with the pillory) by act of congress 1839, Feb. 28. It is still practiced in a few of the states—notably Del.—but in most of the states it has yielded to the penitentiary system.

As regards corporal punishment in the army and navy, see FLOGGING.

WHIPPLE, *hwĭp'l*, ABRAHAM: naval officer in the American Revolution: 1733–1819, May 29; b. Providence, R. I. He was first a capt. in the W. India trade, afterward commanding a noted privateer in the French war. In 1772 he led a secret expedition that burned an obnoxious revenue-vessel in Narragansett Bay. In 1775, June, he was appointed, by the authorities of Rhode Island, commodore, in command of two armed vessels, and captured near Newport the tender of the Brit. frigate *Rose*. In four years following 1775, with the schooner *Providence*, he seized and destroyed an unexampled number of the enemy's vessels. His own vessel was captured, and then, in the frigate *Providence*, he ran a blockade of Narragansett Bay 1779, carried dispatches to France, and, on his homeward voyage, fell in with 150 vessels from Jamaica, convoyed by a Brit. man-of-war. He hoisted the Brit. flag, passing his ship off as a merchantman, and, on successive nights, quietly seized and manned 10 vessels, with valuable lading, getting them out of sight before morning. Eight of these prizes reached patriot ports. In 1780, while defending Charleston, he was taken prisoner, and held until the end of the war. He was capt., 1784, of the first ship that bore the U. S. colors in a voyage to London. Retiring to a farm at Cranston, R. I., he was afterward one of the pioneer farmers in Ohio, settling at Marietta, where he died.

WHIP'PLE, AMIEL WEEKS: soldier: 1818–1863, May 7; b. Greenwich, Mass. After studying at Amherst and graduation at West Point, he was on hydrographical surveys 1841–2, asst. astronomer on boundary surveys 1844–49, at the head of the Pacific railway survey on the 35th parallel 1853, and engineer in the light-house and other depts. 1856. In the beginning of the civil war he was chief topographical officer on the staffs successively of Gens. McDowell and McClellan, and was promoted lieut.col.; 1862 commanded the defenses of Washington on the right bank of the Potomac, having been promoted brig.gen.; led his division, as one of the third corps, in the second battle of Fredericksburg, 1862, Dec. 13 (having previously won his colonelcy in the first battle there); and was fatally wounded at the battle of Chancellorsville, 1863, May 4, dying in Washington three days later, but not before he had been brevetted maj.gen. for gallant conduct.—His son Capt. CHARLES WILLIAM W. has been chief ordnance officer in the dept. of the Missouri.

WHIP'PLE, EDWIN PERCY: reviewer and lecturer: 1819, Mar. 8—1886, June 16; b. Gloucester, Mass. After education in the Salem high school, where he distinguished himself as scholar and writer, he was employed successively in a bank, a broker's office, and long as news-room supt. in the Boston Merchants' Exchange; subsequently as literary editor of the *Evening Transcript* and Boston *Globe*. From 1843 onward he became widely known as a lecturer, and as a reviewer of extraordinary insight and brilliancy, notable especially for nerve, pith, and power of diction. He published *Essays and Reviews*, 2 vols. (1848-9); *Literature and Life* (1849); *Character and Characteristic Men*

(1866); *Success and Its Conditions* (1871); *Literature of the Age of Elizabeth* (1876); and a volume, *Recollections of Eminent Men, and other Papers*, was published the year after the author's death. Mr. Whipple died in Boston. He was beloved for his geniality in social intercourse, a quality marked in his writings.

WHIP'PLE, HENRY BENJAMIN, D.D.: bishop of the Prot. Episc. Church: b. Adams, N. Y., 1822, Feb. 15. Ill health obliged him to turn from college to business as a merchant in his native place; but he was soon attracted to the ministry, and, after theological study, was ordained at Geneva, N. Y., by Bp. De Lancey. He officiated as priest at Sackett's Harbor, N. Y.; seven years as rector at Rome, N. Y.; and two years in the Church of the Holy Communion in Chicago. In 1859 he was consecrated first bp. of Minn. The next year he was an active promoter of the Seabury mission, the girls' school, and a school for boys, at Faribault, Minn. The mission became a divinity school, of which one of the buildings bears his name. His wise and self-denying efforts for education and improvement of the Indians led to his appointment by the U. S. govt. on a commission for their benefit. He was one of the administrators of the Peabody education fund. He wrote much in regard to philanthropic enterprises. He died 1901, Sept. 16.

WHIP'PLE, WILLIAM: one of the signers of the Declaration of Independence: 1730, Jan. 14—1785, Nov. 28; b. Kittery, Me. He was in command of a vessel in foreign trade before he was of age; and, when nearly 30 years old, left the sea for mercantile business in Portsmouth, N. H. He was elected to congress 1775, 76, and 78, and to the state assembly 1780–84. Made brig.gen. 1777, he led a brigade in the battles of Saratoga and Stillwater; and, the next year, had part in Gen. Sullivan's siege of Newport For two years from 1782 he was supt. of N. H. state finances, and judge of the state supreme court; and, from 1784 until his death in Portsmouth, 'justice of peace and the quorum' for the state. It is noteworthy that he emancipated his own slaves, though he had been a slave-trader.

WHIP'PLE, WILLIAM DENISON: soldier: b. Nelson, N. Y., 1826, Aug. 2. After graduation at West Point 1851, and service in New Mexico, he was at Indianola, Tex., whence, on the seizure of the post by secessionists, he escaped north; was appointed capt., and asst. adjt.gen.; participated in the battle of Bull Run; and 1862 was promoted lieut.col., and was Gen. Cadwallader's chief of staff. The next year, commissioned brig.gen. of vols., he was chief of staff to Gen. George H. Thomas, and acted in the memorable battles and operations conducted by that general. For his distinguished services he was brevetted maj.-gen. in the regular army 1865. After the war he was asst. adjt.gen. in a number of divisions, and aide-de-camp to the head of the army, Gen. Sherman, 1873–81. In 1887 he was promoted col. in the adjt.gen.'s dept.; and 1890, Aug. 2, was placed on the retired list. He died 1902, April 2.

WHIPPLETREE, n. *hwĭp'pl-trē* [*whipple*, a frequentative of *whip* and *tree*]: a swing-bar to which the traces are fastened in a carriage; whiffletree, swingtree, or swingletree (q.v.).

WHIP-POOR-WILL, *hwĭp'pûr-wĭl* (*Caprimulgus* or *Antrostomus vociferus*): species of Goatsucker (q.v.), native of N. America, common in the e. United States. Another name is Night-jar, applied also to other Goatsuckers. It receives its popular name from the fancied resemblance of its notes to the words *Whip poor Will.* It is about 10

Whip-poor-will (*Caprimulgus vociferus*).

in. long, the grayish plumage much mottled and indistinctly marked with small transverse bands of black and buff, the top of the head streaked with black, and a narrow collar, which, as well as the outer tail-feathers, is white in the male, tawny in the female. The bristles at the base of the bill are very stiff, and more than an inch long. This bird is seen seldom during the day, but seeks its food by night, catching moths, beetles, and other insects on the wing. Its flight is near the ground, zigzag, and noiseless. Its notes are heard only during the night, and are clear and loud; so that when a few of these birds are close at hand, the noise is such that those unaccustomed to it cannot sleep. In the more s. parts of the United States, but n. to Ill., the W. is replaced by a larger species, the Chuck-Will's-widow (q.v.); and on the upper Missouri and to the w. by a smaller one (*C.* or *A. Nuttalli*).

WHIR, v. *hwėr* [imitative of a humming noise: Sw. *hurra*, to whirl: Dan. *hvirre*, to buzz, to hum. W. *chwyrnu*, to hum]: to whirl or move round rapidly with a humming noise, as a wheel; to make a noise as partridges or pheasants when they rise from the ground; in *OE.*, to hurry away: N. a rough whirring sound. WHIR'RING, imp.: N. the noise of partridges' or pheasants' wings. WHIRRED, pp. *hwėrd.*

WHIRL, n. *hwérl* [Dan. *hvirvle;* Ger. *wirbele;* Icel. *hvirfle,* to whirl: Icel. *hverfa,* to turn round (see also WHARF)]: to move or to cause to move round rapidly; to turn round or rotate with velocity: N. rapid rotation; anything that moves or is turned with velocity on an axis or centre; gyration; rapid circumvolution; anything moved with rapid rotation. WHIRL, or WHORL, n. in *conch.*, a single turn of the spire of a univalve shell, such as that of the garden snail. WHIRL'ING, imp. *-ĭng.* WHIRLED, pp. *hwérld.* WHIRL'ER, n. *-ér,* one who or that which whirls. WHIRLABOUT, n. *hwérl'a-bowt,* a whirligig or merry-go-round; a carousal. WHIRLBLAST, a whirling blast of wind. WHIRL'BONE, the round cap of the knee; the knee-pan. WHIRL'ICOTE, *-ĭ-kōt,* a cot or bed on wheels; one of the oldest kinds of carriages known in England—used in the 14th c. for conveyance of invalids, and afterwards becoming popular for conveyance of ladies. WHIRL'IGIG, n. *-ĭ-gĭg,* a toy which children spin or whirl round; a miniature wind-mill vane, pivoted with a pin on the end of a stick, which children cause to whirl or revolve rapidly by moving it through the air. WHIRL'POOL, n. *-pôl,* a body of water moving with a circular motion, forming a cavity or vortex in the centre, into which all bodies coming within its influence are drawn and ingulfed; any rotatory or circular motion of water caused by opposing winds and tides. *Whirlpools* on a large scale are rare; but illustrations in miniature are seen in the eddies formed in a river by obstacles or deflections. The two celebrated sea-whirlpools Charybdis (see SCYLLA) and Malström (q.v.) are now known to be merely 'chopping seas,' caused by the wind acting obliquely on a rapid current setting steadily in one direction while the tide is flowing, and in the opposite direction when it is ebbing. During calm weather, neither of these so-called whirlpools is dangerous for large ships; but when the current and the wind are strongly in opposition, the broken swell is so violent and extensive in the Malström as to founder large ships, or drive them against the rocks. Though in neither of these two cases is there any vortical action, instances of such action do actually occur in various localities.

WHIRL'WINDS AND WA'TERSPOUTS: aërial and aqueous currents that assume a whirling or spiral motion.—*Whirlwinds* differ in many respects from the storms described under the titles CYCLONE, STORMS, and TYPHOON. They differ also from tornadoes, which accompany Cyclones (q.v.), though these have a whirling motion. On a very small scale, whirlwinds are of frequent occurrence, shown by the movements of dust in a road. The direction of the eddy of the whirlwinds differs from the rotation of winds in a storm, or in a tornado, in that it may take place either way—right to left, or left to right—ac-

cording to the direction of the stronger of the two winds which give rise to the whirlwind. Thus, suppose it to arise from a n. wind blowing side by side with a s. wind, and to the w. of it; then, if the n. wind be stronger, the whirl will be n., w., s., and e.; but it will be in a contrary direction if the s. wind be stronger. Whirlwinds often originate within the tropics during the hot season, especially in flat sandy deserts; these, becoming unequally heated by the sun, give rise to ascending columns of heated air. In their contact with each other, the ascending currents result in eddies, which draw up with them large clouds of dust, and the whole is borne forward by the wind that may happen to be blowing at the time. This is the origin of the *dust whirlwinds* of India. These dust-storms are frequent in dry warm regions: and in the case of the *simoon,* which may be regarded as a succession of such whirlwinds, they appear on a scale of appalling grandeur. Extensive fires, such as the burning of prairie grass or of buildings, and volcanic eruptions, also cause whirlwinds, by the conflicting currents of heated air which they occasion.

Waterspouts are whirlwinds occurring on the sea or on lakes, though they may be also true tornadoes. When fully formed, they appear as tall pillars of cloud stretching from the sea to the sky, whirling round their axes, and exhibiting the progressive movement of the whole mass precisely as in the case of the dust whirlwind. The sea at the base of the whirling vortices is thrown into violent commotion, resembling the surface of water in rapid ebullition. It is a popular fallacy that the water of the sea is sucked up in a solid mass by waterspouts; but it is only the spray from the broken waves which is carried up. Observations of the rain-gauge conclusively prove this. What are sometimes called *waterspouts on land* or *cloud-bursts* are quite distinct from these phenomena. They are merely extraordinarily heavy falls of rain of a very local character.

WHISK, n. *hwĭsk* [representing the sound of a light or fine body moving rapidly through the air: Ger. *wisch,* a mop, a wisp of straw; *wischen,* to wipe, to sweep: Sw. *wiska,* to wipe, to dust: Dan. *viske,* to wipe or sponge; *visk,* a wisp, a rubber]: a small bunch of grass, straw, or hair, and the like, used as a brush or broom; a quick sweeping motion; an instrument for agitating or whisking such articles as cream, eggs, etc.: V. to sweep, brush, or agitate with a light rapid motion; to move nimbly and rapidly. WHISK'ING, imp. WHISKED, pp. *hwĭskt.* WHISKER, n. *hwĭs'kėr,* one who or that which whisks; one of the long bristly hairs on the upper lip of a cat and some other animals; hence formerly the hair on a man's upper lip; a mustache; now the hair on the cheeks of a man, as distinguished from that on the upper lip, which is called *mustache,* and that on the chin, which is called *beard,* though *beard* is sometimes used for all

the hair on a man's face except the mustache; commonly in the plural *whiskers*. WHIS'KERED, a. *-kerd*, formed into or furnished with whiskers. WHIS'KERLESS, a. *-lĕs*, without whiskers. WHIS'KERY, a. *-kĕr-ĭ*, having whiskers, or with a tendency to have them. WHISP, *hwĭsp*, or WISP, n. *wĭsp*, a handful of straw, or the like, used for whisking or wiping.

WHIS'KER. See WHISK.

WHISKY, or WHISKEY, n. *hwĭs'kĭ* [Gael. *uisge-beatha* (commonly written *usquebaugh*), whisky—from *uisge*, water, and *beatha*, life; equivalent to L. *aqua vitæ*, water of life]: an intoxicating spirit distilled from grain, roots, and other materials, the best being produced from barley after it has been malted, though what is termed raw grain whisky (made from wheat, oats, rice, rye, Indian corn, buckwheat, millet, etc.), after being kept for two or three years, is scarcely inferior in quality. Whisky is made also from beet-root, potatoes, beans, molasses, sugar, etc. In these cases, malt is used to a small extent. In its simple form is in great repute both in Scotland and Ireland. It may, indeed, be considered the national beverage of both these countries and of the United States. Whisky from malt alone is made in the Scotch distilleries as follows: The malt is bruised upon cylinders, and the quantity intended to be mashed is put into the mash pan, water at a temperature of about 170° F. being then added. After two or three hours' agitation the whole is left to repose for an hour and a half, and then the worts are drawn off to about one-third of the water employed. About two-thirds of the first quantity of water of a somewhat higher temperature is put into the pan, and the agitation is renewed for about half an hour. After a second period of repose these second worts are drawn off. Both infusions are now cooked down as quickly as possible to the temperature of 80° or 70° to prevent souring; the wort is cooled down by being exposed in shallow coolers to currents of air, or by being passed through serpentine tubes surrounded with cold water. More water may be let into the pan, and a third wort drawn off, which may be mixed with the other worts, or used instead of water for the first infusion of malt. The quantity of saccharine matter converted into alcohol depends upon the proportion of ferment or yeast introduced into the worts; if too little be used, a portion of the sugar will remain undecomposed; if too much, the spirits will have an unpleasant taste. Generally the worts are let down at the specific gravity of 1.050 or 1.060, and at a temperature of 60° to 50°. For every 100 gallons a gallon of good porter yeast is added and thoroughly incorporated by agitation. An hour after the addition of the yeast fermentation begins to show itself by a ring of froth round the edges of the vat, and in about five hours frothy bubbles cover its whole surface. Large vats generally afford a better result than

small ones, owing to the equality of the fermenting process. It is considered good work when the specific gravity comes down to that of water and superior work when it falls to 0.995. In about 48 to 60 hours the wash begins to get clear and comparatively tranquil, and is then ready for distillation. In its simplest form the still consists of a copper boiler into which the wash is poured. This vessel is furnished with a close head terminating in a bent tube which passes in a spiral form through a vessel filled with cold water. On the application of heat to the still the spirit begins to rise in vapor at 175°, along with more or less steam. These vapors are condensed in passing through the spiral tube, and trickle in fluid form into a receiver. The product of this first distillation is called low wines. This is again distilled at a lower temperature, which gets rid of part of the water and of the fetid oils that had come over with the alcohol. Great purity and strength can only be obtained by repeated distillation.

In the United States, Kentucky whiskies, or those represented to be such, constitute the majority of those consumed for drinking purposes, either medicinal or otherwise. At the head of the various processes of distillation, for excellence of quality of the spirit produced thereby, stands that known in Kentucky as 'sour mash, fire copper,' which is the method that originally estab lished the high reputation of Kentucky whisky; those since employed, while giving a larger yield of spirit to the bushel of grain, procure it at the expense of the quality and flavor thereof. In this process the corn and rye meals are scalded or mashed with hot spent beer, which is the liquid residue of the previous distillation. The mash is then allowed to cool to the proper temperature, when malt is added, and the mash, diluted with a sufficient quantity of water, is left to ferment the time established by law. The diluted mash when fermented is called beer. The beer is distilled in three different ways. In the very smallest distilleries, it is sometimes boiled in copper stills, over wood fires; the vapor, passing through a copper coil or worm, immersed in cold water, is condensed and delivered into a receiver. The condensed liquid is called low wines, or singlings. Singlings contain only a small amount of spirit. This manner of boiling the beer is seldom used, as the large quantity of grain contained in the beer makes it apt to cake in the still; and, becoming scorched, it gives the whisky a strong, smoky flavor, a very little of which, however, is not considered objectionable. The singlings are doubled or again distilled in small copper stills, or doublers, over wood fires, and the vapor again condensed in a copper worm, whence it is delivered into the whisky cistern. The usual way of distilling sour mash whisky is to boil the beer in a wooden still by admitting steam, the vapor being condensed into singlings; the singlings

are doubled as above. In the third way, the beer is boiled in a copper still, by steam confined in a copper pipe, placed inside of the still. The singlings are doubled in small copper stills, over wood fires, in the same manner described. This latter way is considered a great improvement, as it avoids both the scorching of the grain in distilling the beer and the admission of live steam, while it preserves all the characteristics so highly prized in 'sour-mash, fire copper' whiskies. The yield by the sour-mash process is from two to three gallons to the bushel of grain.

In making whisky by the 'steam copper' process, the mash is made and fermented and the beer boiled, in the same manner as for the 'steam' process. The same wooden still is used; but, instead of the vapor from the upper compartment passing directly into a wooden doubler, it is run through a worm and condensed into singlings, which are doubled in a copper still by live steam, or by steam confined in a jacket around the still, or sometimes by fire underneath. The manufacture of whisky in the United States during the year 1907 was 174,712,218 gallons.

In locating a distillery a full supply of clear, bright water, that contains the proper chemical qualities, is the first consideration. It is well known to both chemists and practical distillers that water containing a large quantity of sulphate of lime, earthy carbonates, and no organic matter, is best adapted to distilling. The lime and carbonates being dissolved in the acid generated during the fermentation of the mash, mostly pass off in the form of carbonic acid gas, and leave the water soft and best suited for extracting the active properties of the malt and grain. Great care has to be taken in the selection of the grain. Musty or unsound grain is fatal to the production of fine whisky, and its defects become more prominent as the whisky increases in age. Successful fermentation requires of the distiller not only constant attention, but also extensive knowledge both of the principles of chemistry and of practical results. It is exceedingly injurious to allow the fermentation to be prematurely concluded or to proceed too long. As a general rule, the slower the fermentation and lower the heat at which the distillation is carried on, the finer and purer will be the spirit. The mash being made and fermented, and the beer distilled by whatever process, the whisky is collected in the cistern, and thence run into barrels, under the control of the United States inspector, and in the custody of the United States storekeeper, who has also charge of it while in the bonded warehouse, till the tax is paid.

WHISKY FRAUDS, The: in American civil history, a national internal revenue scandal, which reached its climax in 1874 through the efforts of Secretary of the Treasury B. H. Bristow. Statistics showed that for some

years prior to 1874 the United States had, in St. Louis alone, lost at least $1,200,000 of revenue which it should have received from whisky, yet special agents of the treasury set to work from time to time had failed to do more than cause an occasional flurry among the thieves. The whisky ring was organized in St. Louis when the liberal republicans there achieved their first success. It occurred to certain politicians to have the revenue officers raise a campaign fund among the distillers. This idea the officers modified later, raising money in the same way for themselves, and in return conniving at the grossest thievery. As it became necessary to hide the frauds, newspapers and higher officials were hushed, till the ring assumed national dimensions. Its headquarters were at St. Louis, but it had branches at Milwaukee, Chicago, Peoria, Cincinnati, and New Orleans, and an agent at Washington. A huge corruption fund was distributed among gaugers, storekeepers, collectors, and other officials, according to a fixed schedule of prices. As a result of the investigation by Secretary Bristow arrests were made in nearly every leading city. Indictments were found against 152 liquor men and other private parties, and against 86 government officials, notably the chief clerk in the treasury department, and Gen. Grant's private secretary, Gen. O. E. Babcock.

WHISKY INSURRECTION: a popular name given to a local outbreak in opposition to the excise laws passed by congress 1791, Mar. 3. General objections were urged against the measure and in western Pennsylvania the inhabitants considered the tax an unfair discrimination against their particular region and raised an insurrection. It became necessary for President Washington to call out an army of 15,000 militia to subdue the rebels, who dispersed without bloodshed.

WHISP. See WHISK.

WHISPER, v. *hwĭs'pėr* [O.Dut. *wisperen, wispelen;* Ger. *wispeln;* Icel. *hviskra;* Dan. *hviske;* Sw. *hwiska,* to whisper]: to speak softly or under the breath; to utter in a low and not vocal tone; to prompt or plot secretly: N. a low soft tone of voice audible only to the person or persons spoken to; words uttered in a soft low voice. WHIS'PERING, imp.: N. the act of speaking in a low and scarcely audible tone; the telling of tales to excite suspicions. WHIS'PERED, pp. *-pėrd.* WHIS'PERER, n. *-pėr-ėr,* one who whispers; one who tells secrets; a backbiter; one who slanders secretly. WHIS'PERINGLY, ad. *-lĭ.* WHISPERING GALLERY, a gallery or dome in which the faintest sounds are conveyed to a great distance and with great distinctness.

WHIST, int. *hwĭst* [the int. commanding silence was written *st!* by the Romans: Ger. *st!* hist! Scot. *whisht,* hush, be silent]: listen; be still: ADJ. in *OE.,* not making a noise; mute; still: V. in *OE.,* to silence; to keep silence; to become mute or still.

WHIST.

WHIST: game at cards, believed to be of English origin; probably a development of the game of *trump* (properly *triumph*), which was played in England as early as the time of Henry VII. Trump (or triumph) is mentioned in a sermon delivered by Latimer on the Sunday before Christmas 1529. The game of trump is mentioned also by Shakespeare, punning on the word triumph (see Douce's *Illustrations*, and *Antony and Cleopatra*, act iv. sc. 12). The game of whist is not mentioned by Shakespeare, nor by any writer of the Elizabethan era.

The earliest mention of *whist* (or, properly, *whisk*) is in the poems of Taylor the Water-poet (1621). In the first ed. of Cotton's *Compleat Gamester* (1674), whist has no place; but it is added in the 2d ed. (1680) as a game 'commonly known in England.' Cotton says that 'the game of whist is so called from the silence that is to be observed in the play'; and this derivation of the word has been generally accepted, and was adopted by Dr. Johnson to the extent of explaining whist to be a game requiring silence. But if the original name of the game was whisk, Cotton's derivation fails.

The game was formerly played nine-up: the change to ten-up seems to have taken place in the first quarter of the 18th c. Whist played ten-up is called *long whist*. About 1785 the experiment of dividing the game into half was tried, and *short whist* was the result. The short game soon came into favor; and 1864 in England the supremacy of short whist was acknowledged.

Edmond Hoyle (1672-1769), the first writer of any celebrity on whist (commonly called the father of the game), was born—it is said, but on insufficient authority—in the neighborhood of Halifax, Yorkshire; and was educated as a barrister: he died in London. He published his *Short Treatise* about 1742. He used to give lessons in whist at a guinea a lesson. His *Short Treatise* ran through many editions (16 or more) during his lifetime; and since his death his works have been reproduced in numberless ways.

The game of whist is played with a full pack of 52 cards, by four persons, two being partners against the other two. The partners sit opposite to each other. The partnership is determined by cutting. The two lowest are partners against the two highest, and the lowest has the deal and the choice of seats and cards. In cutting, the ace is reckoned lowest. Each player has a right to shuffle the pack once before each deal, the dealer having the privilege of a final shuffle. The shuffling being concluded, the player to the dealer's right cuts the pack. The dealer, having reunited the packets, deals the cards one at a time to the players in rotation, beginning with the player to his left. He turns up the bottom card (called the trump-card). The deal being completed, the players sort their cards, and the

player to the dealer's left (or leader) plays a card face upward on the table. The other players follow in rotation, being bound to follow suit if they can. When all have played, the 'trick' is complete; it is then gathered and turned over by the winning side. The highest card wins the trick. The ace is highest in playing; and the other cards reckon in the order, king, queen, knave, ten, etc., down to the deuce, or two, which is lowest. If any player cannot follow suit (i.e., has none of the suit led), he may play any card that he chooses. If he plays a card of the suit turned up (called trumps), he wins the trick unless another player also, having none of the suit led, plays a higher trump. The player who wins the trick becomes the leader for the next trick, and so on till the whole hand (consisting of 13 tricks) is played out.

After scoring, the player to the last dealer's left deals in his turn; and in subsequent deals each player deals in turn, the rotation going to the left.

After the hand is played out, the scoring is thus performed: the side who win more than six tricks reckon one for each trick above six; moreover, if honors are counted, the side who either separately or conjointly hold more than two of the following cards, ace, king, queen, and knave of trumps (called honors), reckon as follows: if they hold any three honors, they score two (that being the excess of their honors over their opponents'); similarly, if they hold four honors, they score four. When each side holds two, honors are said to be 'easy,' and neither scores on account of honors. At short whist, players who are at four cannot score honors: the same at long whist with players who are at nine. The side who thus in one hand or in a succession of hands first reach five at short whist, or ten at long, score the game.

A game at short whist is called a single if the adversaries have already scored three or four; a double if they have scored one or two; a treble if they have scored nothing. A game at long whist is a single if the opponents have scored five or more; a double if they have scored less. There is no treble at long whist.

A rubber consists of the best two games out of three: if the same players win two consecutive games, the third is not played. The winners of the rubber win in points the value of the games that they have won, and where the rubber has consisted of three games, the value of the loser's game is deducted. And whether two or three games are played, two points are added for the rubber at short whist; one point for the rubber at long. Thus, if at short whist A B (partners) win a single and a double, they win three points on the games, and they add two for the rubber, making five points. Had A B won the same, but C D (their opponents) won a treble, they would have to deduct three points, the value of the opponents' game, and would win only two points. Long whist is now seldom played.

Whist, especially when honors are counted, is a mixed game of chance and skill. The chance resides in the holding honors and the fortune of having high cards dealt in

the hand. In the United States, however, honors are seldom counted. The skill consists in application of such knowledge as shall, in the long run, turn the chances of the cards in the players' favor. At the beginning of the hand, the first lead presents a problem of almost pure chance; but as the hand proceeds, observation of the fall of the cards, inference therefrom, memory, and judgment come in, so that toward the end of the hand there is often presented a problem of almost pure skill. It is these ever-varying gradations of skill and chance that give the game its chief interest as a scientific pastime.

To become a skilful player, it is necessary to bear in mind that the game is not a game of any given player's hand against the other three, but a combination of two against two. In order that two partners shall play their hands to the best advantage, they must strive as much as possible to play the two hands as though they were one. To this end, it is advisable that they should pursue some uniform system of play, in order that each partner shall understand the plans of the other, and so be placed in the most favorable position to assist him in carrying them out.

From the earliest days of whist it has been generally agreed that the first, called the *original* lead, should be from the player's strongest suit. A strong suit is one that contains either a large number of cards (four or more) or several high cards. The suit containing the largest number of cards (numerical strength) is the one to be preferred. The object in opening with the strongest suit is to exhaust the cards of that suit from the other hands. When this object is accomplished, the cards of the suit which remain in the leader's hand (called long cards) obtain a value which does not intrinsically belong to them. They often become of great service, for, when led, they either compel the adversary to trump, or else they make tricks. And when trumps all are out, the player who has the lead makes as many tricks as he has long cards.

On the other side, by opening weak suits there is great risk of sacrificing partner's strength and of leaving long cards with the opponents.

Some players are accustomed to lead single cards; but experience shows that weak leads, as a rule, do more harm than good. Sometimes a trick or two is made by playing a trumping game; but the chances are that such tactics sacrifice partner's hand and clear the suit for the adversaries.

The proper card of the strong suit to lead has been a matter of controversy. For long the rule was—and very generally still is—to lead the lowest. The intention is for the third player to play his highest, and so to assist in clearing his partner's strong suit. Moreover, if the leader keeps the best cards of his suit in his own hand, he has a fair chance of getting the lead again when his suit is nearly or quite established. But with ace and four or more small ones, it has been considered best to begin with the ace, lest the ace be trumped second round; also, with a strong sequence in the strong suit, it is best to lead one of the se-

quence first, lest the adversaries win with a very small card. The following are the principal leads from sequences:

From ace, king, queen—lead king, then queen.
From ace, king, and small—lead king, then ace.
From ace, queen, knave—lead ace, then queen.
From king, queen, knave, and more than one small—lead knave.
From king, queen, knave, and one small—lead king.
From king, queen, and small—lead king.
From king, knave, ten, nine, etc.—lead nine.
From king, knave, ten, and small—lead ten.
From queen, knave, ten, and small—lead queen.
From knave, ten, nine, and small—lead knave.

After the first trick the lead may remain with the first leader. His best play, as a rule, is to continue his suit. If the lead falls to another player, his play, as a rule, will be to open his best suit; and so on. If the lead falls to the first player's partner, he (the partner) has choice of two modes of play: either first to open a strong suit of his own—e.g., one of those in the list above, and containing four or more cards—or, as is preferable, to continue the suit his partner first led, by returning his partner's suit. The object is to strengthen partner by assisting to clear his strong suit.

In returning a suit, if the player has only two cards of it remaining in his hand, he should return the highest; if more than two, the lowest. The exception is, if he has the winning card, he should return that irrespective of the number of other cards in the suit. The reason of this rule is that, with but two cards of the suit remaining, the player is weak in the suit, and he is therefore bound to sacrifice his good card to support his partner. But with three or more remaining after the first round, he is strong, and is therefore justified in calling on partner to support him.

This rule of play is most important. It should be carefully observed with even the smallest cards, as it enables partner to count the situation of the remaining cards. For example: A leads a suit in which C (his partner) holds ace, three, and two. In returning A's suit, after winning with the ace, C is bound to return the three, and not the two. When C's two falls in the third round, A will know that his partner has no more of the suit. But suppose C's cards to be ace, four, three, and two. In returning the suit, C is bound to choose the two. Then after the third round, A will conclude with certainty that C has at least one more card in the suit.

Late in a hand, the considerations with regard to the lead vary. If there is no indication to the contrary, it is best for each side to continue the suits originally opened by them. But the fall of the cards may show that it is disadvantageous to persevere in the suits first led. In such cases the player must have recourse to other and weaker suits. The general rules to be observed here are: to choose a suit in which there is reason to infer that the right-hand adversary is weak; or—but this is less favorable—one in

which the left-hand adversary is strong. In either case, if the suit chosen contains but three cards, none higher than knave, or only two cards, it is generally right to lead the highest.

The second player, as a rule, should play his lowest card, in order to preserve his strength in the leader's suit. The first trick in the suit is left to partner, who has an even chance of holding a better card than the third player. But if the second hand has a strong sequence, he should play the lowest of the sequence, by which partner's hand may be saved and a high card still remain over the original leader.

The following are the principal sequences:

With ace, king, queen—play queen.

With ace, king, etc.—play king.

With king, queen, knave—play knave.

With king, queen, etc.—play queen.

With queen, knave, ten—play ten.

With queen, knave, and one small—play knave.

When a high card is led, it is advisable for the second player sometimes to cover it with a higher one. The shortest rule is to put an honor on an honor, if with but two or three cards of the suit. With king or queen and four of the suit, it is better to pass an honor led.

When the second hand has none of the suit led, he should, as a rule, trump, if he has but two or three trumps; but he should not trump a losing card if he has more than three trumps, the reason of which will be explained when treating of the management of trumps.

The third hand, as a rule, plays his highest card, in order to support partner in his suit. The exceptions are, with ace, queen, etc., the queen is to be played; and if partner has begun with a high card, it is often right to pass it.

The management of trumps varies according to whether the player is strong or weak in them. If strong (i.e., with four or more), they should not be used for trumping, if it can be avoided, but should be kept together, in hopes of establishing a suit and of remaining with the long trump, with which to get the lead after the other trumps are out, and so to bring it in. Thus, if the opponents lead a losing or doubtful card, it is better, as a rule, not to trump it when holding four trumps. But if the opponents lead a winning card, it is, as a rule, better to trump it, though holding four trumps, than to pass it in hopes of bringing in a suit.

With five trumps, the chance of succeeding in exhausting the opponents' hands and of remaining with the long trump is so considerable that a player having five or more trumps should lead them; and as number is the principal element of strength, he should not be deterred from leading trumps merely because the fourth hand has turned up an honor.

With four trumps only, it is better first to lead the strong suit. When the adversaries' hands are cleared of that suit, or so far cleared that the holder of the long cards in that

suit commands it, it is, as a rule, safe to lead from four trumps.

As a rule, less than four trumps should not be led from. But a player is justified in leading from weak trumps if he holds winning cards in every suit; if the adversaries are both trumping a suit; or if the game is lost unless partner has strength.

It is most important to return partner's trump lead at once, unless he has led from weakness; for partner, by leading trumps, declares a strong game, and it is then the best policy to abandon one's own plans and to support his.

It follows that a player should not, as a rule, lead a card for his partner to trump, unless he has four or more trumps; for with less than four trumps the player is weak; and if he forces his partner to trump, partner is weakened also; and the chances are that by weakening partner under such circumstances the command of trumps will remain with the adversaries.

But a player may force his partner, though weak himself, if partner has already been forced and has not afterward led trumps; if partner has already declared weakness in trumps, as by trumping a doubtful card second hand; if two partners can each trump a different suit; and when one trick from partner's hand wins or saves the game.

The same considerations which make it inexpedient to force partner when weak one's self show the advantage of forcing a strong trump-hand of the opponents.

When a player wishes trumps to be led by his partner, he throws away an unnecessarily high card followed by a lower one. This is called the 'signal' or *asking for trumps.* When the partner who has been thus signalled to also sacrifices an unnecessarily high card followed by a low one, he indicates that he also has a strong hand in trumps—i.e., at least 4. This is called the *echo.*

There are yet some general rules of play which have not been explained.

The second, third, and fourth players should always play the lowest of a sequence. The rule here given is in conformity with the play that would naturally be adopted in playing cards that are not in sequence; and by keeping to a uniform plan, players are enabled to infer what cards their partner does or does not hold. It is true that the adversaries often gain the same information; but it is found by experience that it is of more advantage to inform partner than to deceive the opponents.

As a rule, it is advisable to lead out the winning cards of partner's suit. The presumption is that he has led from his strong suit; and by leading out the winning cards, the suit is cleared for him, and his long cards are not obstructed. The reverse applies to suits led by the adversaries. It is mostly right to retain the winning cards of such suits as long as possible, in order to stop the establishment of them.

When a player has none of the suit led, he should, as a rule, throw away from his weakest suit; for by discarding from a strong suit, its numerical power is damaged. But

when the adversaries have shown great strength in trumps, it is not advisable to keep small cards of a long suit, as it is not likely that it can ever be brought in. Under such circumstances, the player should throw away from his best-protected suit, and keep guards to his weaker ones.

Players should watch the cards as they are played, and endeavor to infer from them where the others lie. Thus, if a player wins a queen with an ace it may be inferred that he has not the king, the rule being to win with the lowest; if a player leads trumps at starting, it may be inferred, as a rule, that he is strong in trumps, or has a very fine hand. By recording in this way, and by counting the number of cards played in each suit, skilled players will often, toward the close of a hand, know the position of all the important cards remaining in; and by means of this knowledge they will be able to play the end of the hand to the same advantage as though they had seen all the cards.

And lastly, and most important of all, players should play to the score. Thus, wanting but one trick to save or win the game, a winning card should be played at once. The example is stated as for one trick; but it should always be kept in mind how many tricks are requisite to win or save the game, or even a point, and the play should be varied accordingly.

AMERICAN LEADS.

Since 1884 what are known as 'American leads' have come into use. These were proposed by Nicholas Browse Trist, of New Orleans. The chief features of the system are: (1) In opening a numerically strong plain suit with a low card, always lead the *fourth-best* (instead of the lowest, as set forth above), thus informing partner that exactly three cards all higher than the one led are held by the leader. (2) In opening a strong suit with a high card followed on next round with a low card, that low card should always be the *fourth-best* counting from and including the one first led. This informs partner that exactly two cards intermediate in value between the two leads are held. (3) In opening a strong suit with a high card followed on second round with another high card, partner may be informed both as to the nature of the combination held and the number of the cards in the suit, if the lower of two high indifferent cards (queen or knave) left in the hand is led from a suit of five, and the higher of two such cards from a suit of four. Thus, if ace is led from ace, queen, knave, and small card, and then queen on second round, partner knows that the original lead was from a suit of four, and will not block the leader's command by playing king on queen. Therefore, from ace, king, queen, knave, and one small, lead knave, then ace; from ace, king, queen, knave, and two small, lead knave, then king; from ace, king, queen, knave, and three small, lead knave, then queen; the rule being that the greater the number of cards in the suit, the lower the indifferent card led on the second round.

The following are the

PRINCIPAL LEADS OF HIGH FOLLOWED BY HIGH:

From	Lead
A., Kg., Qu., Kn., and 3 small:	Kn., then Qu.
A., Kg., Qu., Kn., and 2 small:	Kn., then Kg.
A., Kg., Qu., Kn., and 1 small:	Kn., then A.
A., Kg., Qu., Kn., and no small:	Kg.,* then A.
A., Kg., Qu., and 3 small:	Qu., then Kg.
A., Kg., Qu., and 2 small:	Qu., then A.
A., Kg., Qu., and 1 small:	Kg.,* then Qu.
A., Kg., and 3 small:	A., then Kg.
A., Kg., and 2 small:	Kg.,* then A.
A., Qu., Kn., 10, and no small:	A.,† then 10.
A., Qu., Kn., and 2 small:	A.,† then Kn.
A., Qu., Kn., and 1 small:	A.,† then Qu.
Kg., Qu., Kn., 10, and no small:	Kg.,* then 10.
Kg., Qu., Kn., and 3 small:	Kn., then Qu.
Kg., Qu., Kn., and 1 small:	Kg.,* then Kn.
Kg., Kn., 10, and 2 small:	10, then Kn.
Kg., Qu., 10, and 1 small:	10, then Kg.
Qu., Kn., 10, 9, and no small:	Qu., then 9.
Qu., Kn., 10, and 2 small:	Qu., then 10.
Qu., Kn., 10, and 1 small:	Qu., then Kn.

In leading trumps the same rule is followed as in plain suits, except when leading from knave, ten, nine, etc., and when the value of the turn-up card suggests something different. Thus with queen, knave, nine, eight, two, the leader should begin with the two and not with the fourth-best, if partner turns up ace, king, ten, or seven; or with ace, queen, knave, and small, the leader should open with a small one, if ten is turned up by partner; or with ace, queen, ten, and small, with knave turned up at leader's right, the first lead should be queen. From knave, ten, nine, eight, lead knave, then eight; from knave, ten, nine, and two small, lead knave, then nine; from knave, ten, nine, and one small, lead knave, then ten; from ace and more than five small, lead ace, then fourth-best; from king, queen, ten, and more than one small, lead queen, then fourth-best; and so on. When a player who holds only four trumps is forced, he should trump with his fourth-best. If he then leads with a low card, he goes on with his lowest remaining card. When a player who holds five trumps is forced, he plays his fourth-best and continues with the lowest. In six-card suits the rule is to trump with the lowest but one, and then lead the fourth-best. 'When, after a force, a player holds such high trumps that he has to open the suit with a high card, he leads according to the number of trumps that he now holds, not according to the number that he held originally. Take first the case of four trumps, one of which has been used for trumping. From queen, knave, and two small ones, the fourth-best is led; from queen, knave, and one small one, the queen is led. Hence a player holding queen, knave, and two small ones and having been forced, should lead the queen. With five trumps the player who has been forced, and who then leads a high card, treats the suit as though he held only four

* An original lead of king signifies four in a suit.

† An original lead of ace signifies at least five in a suit, or ace, queen, knave.

originally—for example, with ace, queen, knave, and two small ones, one having been used in trumping, ace, then queen (not knave), should be led. . . . With six trumps . . . , high cards are led after a force, as though five had been held originally' (Cavendish, *Whist Developments*, which see for an account of the modifications of the play of the second and third hands which are rendered necessary when American leads are adopted).

LAWS OF WHIST as adopted by the American Whist Congress held at Milwaukee, Wisconsin, 1891, Apr. 14–17:

SCORING.

1. Each trick above six shall count one point. The game shall consist of seven points. In case of tournaments, matches, and club scores, for purposes of comparison each hand shall be played out and every trick taken shall be scored. The above shall be the standard game, but players or clubs may, by rule or agreement, provide for other methods of scoring.

2. The penalty for a revoke shall take precedence of all other scores. [To *revoke* is to play a card different from the suit led when able to follow suit. The penalty for this error, whether intentional or accidental, is the forfeiture of three tricks: but see 45 below.]

3. If an erroneous score shall be proved, such mistakes can be corrected prior to the conclusion of the game in which it occurs, and such game is not concluded until the trump card of the first deal in the following game has been turned.

CUTTING.

4. In cutting, the ace is the lowest card. In all cases every one shall cut from the same pack, and if a player exposes more than one card he must cut again.

FORMATION OF THE TABLE.

5. In the formation of the table those first in the room shall have the preference. If, by reason of two or more arriving at the same time, more than four assemble, the preference among the last comers shall be determined by cutting a lower cut, giving the preference over all cutting high. A complete table shall consist of six. The four having the preference shall play.

6. The formation of the table having been determined the players shall cut for partners and deal at the commencement of each game.

7. In cutting for partners the two highest shall play against the two lowest. The lowest shall have the deal and the choice of seats and cards, and must abide by his first selection. If the two lowest cut cards of equal value, they shall cut again for deal.

8. If two players cut intermediate cards of equal value those two shall cut again, and the lower of the new cut shall play with the original low.

9. If three players cut cards of equal value, those three shall cut again. If the fourth has cut the highest card, the two lowest of the cuts shall be partners, and the lowest shall

have the deal. If the fourth cut the lowest card, he shall be the dealer, and the two highest of the new cut shall be partners.

10. At the end of the game, should there be more than four members belonging to the table, sufficient number of the players shall retire to admit those waiting their opportunity to play. In determining which players shall remain in, those who have played a less number of consecutive games shall have the preference over all who have played a greater number; and between two or more who have played an equal number, the preference shall be determined by cutting, a lower cut giving the preference over all cutting higher.

11. A candidate wishing to enter a table must declare such intention prior to any of the players having cut a card for the purpose either of commencing a new game or of calling out.

12. Tables may be formed and partners chosen by agreement, except when prohibited by a club rule.

SHUFFLING.

13. Before every deal the cards shall be shuffled and shall be presented by the dealer to his right-hand adversary to cut.

14. The pack must not be shuffled so as to expose the face of any card, nor during the play of the hand.

15. Where two packs are used, the dealer's partner shall collect and shuffle the cards for the ensuing deal and place them at his right hand.

CUTTING TO THE DEALER.

16. In cutting to the dealer not less than four cards shall be left in each packet.

17. If in cutting or in reuniting the separate packets a card is exposed, or if there is any confusion of the cards or doubt as to the place where the pack was separated, there must be a fresh cut.

18. When the pack has been presented by the dealer to be cut, and has been cut by the adversary in accordance with rules 16 and 17, should the dealer reshuffle the cards he shall lose his deal.

DEALING.

19. The fifty-two cards shall be dealt into four packets, one at a time in regular rotation, beginning with the player at the dealer's left; and, having been regularly dealt out, the last, which is the trump card, shall be turned up before the dealer.

20. There must be a new deal, first, if during the play of a hand the pack be proved incorrect or imperfect; second, if any card except the last be faced in the pack.

21. If, while dealing, the dealer or his partner exposes a card, and neither of the adversaries has touched the cards, the latter may claim a new deal. A card exposed by either adversary gives that claim to the dealer, provided his partner has not touched a card. If a new deal does not take place, the exposed card cannot be called.

22. If the dealer before or during the deal looks at the trump card, his adversaries have a right to see it and may exact a new deal.

MISDEAL.

23. If the dealer distributing cards, I., gives more than two cards incorrectly; II., counts the cards on the table or the remainder of the pack; III., places the trump card on the other cards without having turned it up, it is a misdeal and the deal passes to the next player.

24. If after playing to the first trick a player is found to have less than his proper number of cards, and the missing card or cards be found in his adversaries' hands, the deal is void; if the missing card or cards be found in his partner's hand, the adversaries may consult and have the choice, I., of retaining the same hands and rectifying the error by drawing a card or cards, or, II., having a new deal.

25. A misdeal shall not lose the deal, if during the deal either of the adversaries has touched the cards prior to the dealer's partner having done so; but should the latter have first interfered with the cards, notwithstanding either or both of the adversaries have subsequently done the same, the deal is lost.

26. Should three players have their right number of cards and the fourth have less than thirteen, and such deficiency be not discovered until after he has played to the first trick, the adversaries may consult and shall have the choice; I., to claim a new deal; II., to have the hands played out as they stand, in which case the missing card shall be considered as played to the last trick, but no revoke shall be claimed because of such missing card.

27. If a pack of cards be imperfect, the deal in which the fault is discovered shall be void, but the previous ones shall hold good.

28. Any one dealing out of turn or with the adversary's cards may be stopped before the trump card is turned, after which the game must proceed as if no mistake had been made.

29. If the adversaries interrupt a dealer while dealing, either by questioning the score or asserting that it is not his deal, and fail to establish such claim, should a misdeal occur he may deal again.

THE TRUMP CARD.

30. The dealer, when it is his turn to play to the first trick, shall take the trump card into his hand. If left on the table after the second trick has been turned and quitted, it becomes an exposed card.

31. If the dealer takes the trump card into his hand before it is his turn to play to the first trick, he shall, at the request of his adversaries at any time before the second trick has been turned and quitted, replace it face up upon the table.

32. If the dealer, when called upon under the preceding rule to replace the trump card, declares himself unable to recollect it, his highest or lowest trump may be called, and, unless it cause him to revoke, must be played. The call

may be repeated, but not changed—i.e., from highest to lowest, or *vice versa*—until such card is played.

EXPOSED CARDS.

33. The following are exposed cards: I. The trump card if left face upward on the table after second trick is turned and quitted. II. Two or more cards played at once. III. Any card exposed in any manner so as to be seen by a partner, no matter how exposed, whether dropped on the table, thrown on the table, or held above the table, detached or not detached.

34. A card is not an exposed card when dropped on the floor or elsewhere below the table.

35. All exposed cards shall be liable to be called, must be left face upward on the table, and must not be taken into the player's hand again; the player is bound to play them when they are called, provided he can do so without revoking. The call may be repeated whenever it is the player's turn to play, until the card is played. A player cannot be prevented from playing a card liable to be called; if he can get rid of it in the course of play, no penalty remains.

36. If a player leads a winning card—i.e., one better than any that his adversaries hold of the suit—and then leads another, or plays several winning cards without waiting for his partner to play, his partner may be called upon to take the first trick, and the other cards thus improperly played are exposed cards: it makes no difference whether he plays them one after the other, or throws them all on the table together; after the first card is played, the others are exposed.

37. A player having an exposed card on the table shall not play until the adversaries have stated whether or not they wish to call that card. If he plays another card without waiting, such card shall also become an exposed card.

LEADING OUT OF TURN.

38. If any player leads out of his turn, a suit may be called from him or his partner when it is next the turn of either of them to lead. The penalty shall be exacted by the player on the right of the one from whom the suit is called.

39. If a player leads out of turn and the other three follow him, the trick is completed and the error cannot be rectified; but if only the second or the second and third players have played to the false lead, the cards improperly played may be taken back, and such cards cannot be called; the original offender, or his partner, is liable to the penalty for leading out of turn.

40. If a player has none of the suit he is called on to lead, the penalty is paid.

PLAYING OUT OF TURN.

41. If the third hand plays before the second, the fourth hand may also play before the second.

42. Should the third hand not have played, and the fourth hand have played before his partner, the latter may

be called upon to play his highest or lowest card in the suit led, or, if he has none, to trump or not to trump the trick.

43. If any one omits playing to a trick, and such error is not discovered until he has played to the next, the adversaries may claim a new deal; should they decide that the deal stand good, the surplus card at the end of the hand shall be considered to have been played to the imperfect trick, but shall not constitute a revoke therein.

44. If any one plays two cards to the same trick, or mixes the trump card or any other card with a trick to which it does not properly belong, he shall be liable to the same penalty as provided in rule 26.

THE REVOKE.

45. It is a revoke when a player, holding one or more cards of the suit led, plays a card of a different suit.

46. The penalty for a revoke, I., is at the option of the adversaries, who at the end of the hand may consult together, and take three tricks from the revoking player and add them to their own, add three points to their own score, or deduct three points from his score (or all his points if he has less than three); II., can be claimed for as many revokes as occur during the hand; III., is applicable only to the score of the game in which it occurs; IV., cannot be divided—that is, a player cannot add one or two to his own score and deduct one or two from the revoking player; V., takes precedence of every other score.

47. A revoke is established if the trick in which it occurs has been turned and quitted, or if either the revoking player or his partner, whether in his right turn or otherwise, has led or played to the following trick.

48. At the end of a hand the claimants of a revoke may search all the tricks.

49. If a player discovers his mistake in time to save a revoke, the card improperly played becomes an exposed card. Any player or players who have played after him may withdraw their cards and substitute others. The card so withdrawn are not liable to be called.

50. If a revoke has been claimed, and the accused player or his partner mixes the cards before they have been examined to the satisfaction of the adversaries, the revoke shall be deemed established. A revoke may be claimed as soon as perceived, which claim shall be considered notification to the adversaries not to mix the tricks until they have been examined.

51. A revoke may be claimed at any time before the cards have been presented and cut for the following deal, but not afterward.

52. The revoking player and his partner may, under all circumstances, require the hand in which the revoke has been detected to be played out.

53. Should the players on both sides subject themselves to the penalty of one or more revokes, neither can win the game; each is punished at the discretion of his adversary, as provided in rule 46.

54. In whatever way the penalty is enforced, under no

circumstances can the player win the game by the result of the hand during which he has revoked, and he cannot score more than six.

MISCELLANEOUS.

55. If a player is legally called upon to play the highest or lowest of a suit, or to trump or not to trump a trick, or to lead a suit, or to play a card subject to be called, and unnecessarily fails to comply, he shall be liable to the same penalty as if he had revoked.

56. Any one during the play of a trick, and before the cards have been touched for the purpose of gathering them together, may demand that each player draw his card.

57. If any one, prior to his partner playing, calls attention to the trick in any manner, as by saying that it is his or his adversary's, or by naming his own or his adversary's card, or by placing any of the cards played without having been lawfully required so to do, his adversaries may require their opponent to play the highest or lowest of the suit then led, or, if he has none, to trump or not to trump the trick.

58. In all cases where a penalty has been incurred, the offender shall await the decision of his adversaries.

59. When a trick has been turned and quitted, it cannot again be seen until after the hand has been played.

60. Should any player say, 'I can win the rest,' 'The rest are all mine,' 'I have won the game,' or use words or signs to that effect, his hand shall be laid upon the table and treated as exposed cards.

61. No conversation shall be indulged in during the play of the hand except such as is required or permitted by the foregoing rules.

For more detailed information, the reader is referred to Professor P.'s Essay on the modern scientific game (Longman, Green, etc.); *Cavendish's Principles of Whist* (De la Rue & Co.); 'J. C.'s' Treatise on the game (Harrison); and *Cavendish's Whist Developments* (De la Rue & Co.); also *Foster's Whist Manual* (Brentano, New York 1891), in which is given an ingenious system of rules for play in all circumstances, which will repay careful study.

WHISTLE, v. *hwĭs'l* [imitative of the sound made by the rushing of air: AS. *hwesan;* Icel. *hvæsa,* to breathe audibly, to hiss: Dan. *hvisle;* Icel. *hvisla;* Sw. *hwissla,* to hiss, to whistle]: to utter musical sounds and perform musical compositions in the manner of a wind-instrument by expelling or drawing in the breath through an orifice formed by contracting the lips; to utter musical sounds with a small wind-instrument; to sound shrill, as the wind; to call or signal by a whistle: N. the sound made by one who whistles; a small wind-instrument; the sound made by it; a call such as sportsmen use to their dogs; the shrill sound produced by the wind among trees, etc. WHIS'TLING, imp. *-ling:* ADJ. uttering musical sounds by contracting the lips; sounding with a pipe; making a shrill sound, as wind: N. the shrill sounds of a whistle, or those made by the wind. WHISTLED, pp. *hwĭs'ld.* WHIS'TLER, n. *-lĕr,* one who

whistles. WHIS'TLINGLY, ad. *-lĭ*. TO WET ONE'S WHISTLE, to take a draught—that is, to wet the part which whistles, or the throat. TO PAY TOO DEAR FOR ONE'S WHISTLE, to pay an excessive price for the gratification of some desire.

WHISTLER, *hwĭs'lẽr*, GEORGE WASHINGTON: civil engineer: 1800, May 19—1849, Apr. 7; b. at Fort Wayne, Ind. He was of a family of soldiers, his father, Major John Whistler, serving in the revolutionary war, and subsequently in the United States army. He graduated at West Point 1819, and was assigned to topographical work, with an interval, 1821-2, as assistant professor at West Point. Resigning from the army 1833, he was engaged in constructing the Baltimore and Ohio, the Boston and Albany, the Stonington and Providence railroads, and the canals at Lowell. While at Lowell, he planned the first three locomotives used by the Boston and Albany road, of which road he was chief engineer 1841-2, living in Springfield, Mass. In 1842 he undertook the St. Petersburg and Moscow railroad, and superintended its construction and the manufacture of its entire equipment, for which he was decorated by the emperor 1847. He died in St. Petersburg, and was buried at Stonington, Conn., having also a monument to his memory in Greenwood Cemetery, Brooklyn, erected by engineers.

WHISTLER, JAMES ABBOTT MCNEILL: American artist: b. Lowell, Mass., 1834, July 10; d. London 1903, July 17. In 1851 he was appointed to the West Point Military Academy, which he left in 1854; and in 1854-5 was a draughtsman in the coast and geodetic survey. This employment he soon quitted, going to England and thence to Paris, where in 1855-7 he was a pupil in the studio of C. G. Gleyre, an artist of Ingres' school who 'never drew a line without having first assured himself how Raphael would have proceeded.' Previous to the series generally styled the 'French Set,' Whistler is known to have etched three plates, and other early attempts were almost certainly made. The 'French Set' renderings of figures, street scenes, and interiors, appeared in 1858 (published by Delâtre)—12 plates, with an etched title. But a few copies were printed. In 1863 Whistler went to London and settled in Chelsea. During his earlier days there he completed the 'Thames Set' of etchings, 16 in all, treating of the craft of that stream and the quaint buildings along its edge. Some rare prints of these, generally considered superior, were made before their publication in 1871. *The Pool* and *Black Lion Wharf* are among the best of them. He exhibited his paintings quite frequently at the Royal Academy, one of the earliest being *At the Piano*, purchased by the Scottish painter John Phillip for 30 guineas. In 1872 the *Arrangement in Gray and Black* ('The Painter's Mother'),

now in the Luxembourg Gallery, was accepted by the academy only on the insistence of Sir William Boxall. Whistler sent other pictures, such as *The Last of Old Westminster* and *Symphony in White III.*, but he could not agree with the management of that institution, long before his death ceased to exhibit there, and was never made A.R.A. Some of his best work was shown at the Grosvenor Gallery, opened by Sir Coutts Lindsay in 1877, including famous portraits, *Irving as Philip II.* and the 'Arrangements,' 'Harmonies,' and 'Nocturnes,' novel in title and character. It was in 1877 that Ruskin wrote of the *Nocturne, Black and Gold,* 'The Falling Rocket,' then at the Grosvenor: 'I have seen and heard much of cockney impudence before now, but never expected to hear a coxcomb ask 200 guineas for flinging a pot of paint in the public's face' (*Fors Clavigera*). Then ensued the diverting Ruskin suit, brought for libel by the artist and heard in November, 1878. The verdict was for the plaintiff, and the farthing assessed for damages Whistler afterward wore on his watch chain. The costs against Ruskin, £306 12s 4d, were met by a public subscription. Whistler followed up the affair by his pamphlet, *Art vs. Art-Critics,* in which he first proved his cleverness in controversial satire.

He failed for a long time of the recognition he merited, but latterly many distinctions were conferred upon him. He was a member of the Legion of Honor and the Bavarian Order of St. Michael, member of the Munich, Rome, Dresden, and other academies, in 1900 received the unusual award at the Paris exposition of the gold medal for etching and also for painting, and in 1902 the gold medal of honor from the Pennsylvania Academy of Fine Arts. By many Whistler's etchings have been ranked as the consummate product of his art, classed with those of Rembrandt, and even said to surpass the world's greatest etcher in the process of selecting essentials and a certain subtlety in execution. He did not keep a set of proofs or memoranda of his work, and it is as yet impossible to make a complete list of his etchings. The first catalogue of them appeared in 1874. Wedmore gave 214 in 1886, 268 in 1889; a supplement to Wedmore increased the number to 372. It is probable that with the search certain to be made the list will be brought up to more than 400 prints. It has been said, and probably with much justice, that while Rembrandt chose greater subjects, only a comparatively small part of the total number of his plates is sought by collectors, but all of Whistler's are highly esteemed by connoisseurs. The unfailing characteristics of the etchings are precision and flexibility of line, and remarkable picturesqueness in the rendering of shade and light. Their observation and their technical skill are alike noteworthy. In pastel and water-colors Whistler wrought sparingly, although some of the Venetian pastels are the

equals of anything yet attempted in that medium. For a long time in London he was better known for his pugnacity than for his art. His arrogance, his mordant wit, his sparkling bon-mots, his striking individuality—these were sooner recognized than his genius. He had in oils a broad range of subjects. There are the numerous portraits; marines ('Valparaiso Harbor'; 'Blue Wave—Biarritz'; 'The Ocean'); and landscapes of many sorts, especially those interpretative of night. His method was to apply many coats of thin color instead of one or a few of greater consistency; this guarantees to his work a superior permanence. He was above all the colorist, and in pure line and color harmonies has been called one of the supreme artists. His work has repeatedly been compared to that of Velasquez, but study shows very important dissimilarities, and Whistler must remain unique. He borrowed somewhat from oriental art, though always subordinating these elements to his own ends. Whistler did also some work in interior decoration, such as the music-room of Sarasate (Paris) and the *Peacock-room* for Mr. Leyland (London). Many fine examples of his paintings are in American galleries, public and private. His place in the history of art cannot yet be estimated, but he may safely be put among the greatest painters of the 19th century.

WHISTON, *hwis'ton*, WILLIAM: English clergyman and mathematician: 1667, Dec. 9—1752, Aug. 22; b. Norton, in Leicestershire, of which place his father was rector. He entered at Clare College, Cambridge, where he distinguished himself in mathematics; he took his degree 1690, and obtained a fellowship 1693. The next year he became chaplain to Dr. More, bishop of Norwich; and 1698 received the living of Lowestoft, in Suffolk. In 1696 appeared his *Theory of the Earth*, which, despite, or perhaps because of, the oddity of some of its speculations, procured him considerable reputation. In 1703 by the express influence of Sir Isaac Newton, he was appointed to succeed him in the Lucasian professorship at Cambridge; whereupon he gave up his living, and settled at the university. He continued in clerical work; and such was his succes as a preacher, that he would probably have attained high position in the church, had not the development of his theological opinions led him into Arian heresy—his frank avowal of which, at once in preaching and writing, led to his expulsion from his professorship and the university 1710. In the same year appeared the most noted of his original writings, *An Historical Preface to Primitive Christianity Revived*. His subsequent prosecution in the church courts forms a curiously complicated chapter in the history of such matters. After five years of suspense, during which the proceedings swayed strangely hither and thither, Whiston was permitted to remain formally a member of the Church of England. By many of the

clergy, however, much dissatisfaction was expressed; and some even refused to admit him to communion. When Halley, 1720, proposed him as a member of the Royal Society, Whiston's old friend Newton successfully opposed his admission. Whiston himself, the most amusingly vain of men, was convinced that Newton's conduct was dictated by jealousy of his superior scientific genius —a notion in which probably few agreed with him. Having no ostensible means of livelihood, Whiston was frequently reduced to great straits; but he had kind friends, ready to assist him at need. In dissemination of his religious opinions he continued unwearied. He also busied himself much with scientific crochets. Of his numerous works, a translation of Josephus was the only one which perpetuated his name, and of this there have been several reprints. His Memoirs of his own life (3 vols. 1749-50) is a curious specimen of self-portraiture, vividly depicting this whimsical, eccentric, but thoroughly conscientious man. His Arianism was developed not at all from a rationalizing tendency, but entirely from his conception of the tenets of the primitive church. He held stoutly to supernatural Christianity, and earnestly defended prophecy and miracle—even advocating anointing the sick and touching for the king's evil.

WHIT. n. *hwĭt* [AS. *wiht,* a creature, a thing: Goth. *vaiht,* a thing (see also WIGHT 1)]: a small part; an atom or least bit; a point; a jot.

WHITAKER, *hwĭt'a-kẽr,* DANIEL KIMBALL, LL.D.: editor: 1801, Apr. 13—1881, Apr. 10; b. Sharon, Conn.; grandson of the Rev. Nathaniel Whitaker. He graduated at Harvard 1820, studied law, and settled in South Carolina, becoming the law partner of ex-Gov. John Lyde Wilson. Though eminently successful as a lawyer, his preferences were for literature, and he established and edited a number of periodicals, among them the *Southern Literary Journal* and *Whitaker's Magazine.* In 1841 he established at Charleston, S. C., the *Southern Quarterly Review,* which he edited until the civil war. In 1866 he moved to New Orleans, La.; and founded and for many years edited the New Orleans *Monthly Review.* He was corresponding secretary of the New Orleans Academy of Sciences. He died in New Orleans.

WHIT'AKER, NATHANIEL, D.D.: 1732, Feb. 22—1795, Jan. 21; b. Long Island, N. Y. He graduated at Princeton 1753, and from that time till 1761 was pastor of a Presbyterian church at Chelsea (near Norwich), Conn. In 1766 the Connecticut branch of the Scotch Society for the Advancement of Learning sent him to England, Scotland, and Wales, to solicit aid for educating and Christianizing the North American Indians. The Rev. Samson Occum, a Mohican Indian, educated at the school of the Rev. Eleazar Wheelock, accompanied him. The Earl of Dartmouth, then secretary of American affairs, by his

influence and by his own contributions materially assisted them; and their mission was so successful that during their two years' absence the sum of £11,000 (about $55,000) was raised; and until the revolution additions were made to this from time to time. This sum was placed in the hands of trustees as an endowment for Moor's Indian Charity School, from which Dartmouth College grew. After his return from Europe, Whitaker built at his own expense, and for many years preached in, what was known as the Tabernacle Church at Salem, Mass. In the revolution he warmly supported the cause of the colonies. The last years of his life were spent at Woodbridge, Va., where he died. Some of his sermons have been published.

WHITBY, Canada: capital of Ontario co.; a town and port of entry on Lake Ontario, at the southern terminus of the Whitby and Port Perry railway, and on the Grand Trunk railway, 30 m. e. of Toronto. It has iron foundries, tanneries, manufactures of agricultural implements, mill machinery, and musical instruments, and carries on an active agricultural trade. Pop. (1901) 2,110.

WHITBY, England; seaport in the North Riding of Yorkshire, 48 m. n.n.e. of York, at the mouth of the Esk, which divides it into two parts. The houses are ranged on bold acclivities, and an ancient restored cruciform church stands on the verge of a lofty cliff; there are several modern churches and Nonconformist chapels; a town hall, court house, museum, temperance hall, seamen's hospital, etc. The harbor is spacious and commodious, having wet and dry docks, etc. The manufacture of jet ornaments is carried on, this substance being abundant in the neighborhood. There are also yards for ship and boat building, and productive sea fisheries. The poet Cædmon (q.v.) was a resident in this monastery, of which nothing now remains, though the choir, north transept, and part of the nave of an abbey erected on the site in the 11th century are still standing. These ruins are in early English style and extremely beautiful. The neighborhood is rich in picturesque scenery and interesting features. Pop. (1901) 11,748.

WHITBY, *hwĭt'bĭ*, DANIEL, D.D.: theologian notable for learning, and for changeableness of views: 1638-1726, Mar. 24; b. Rushden, Northamptonshire, England. He graduated at Trinity College, Oxford, about 1657, and 1664 obtained a fellowship there; took orders in the Church of England, and after several preferments was made rector of St. Edmund's, Salisbury. He became a distinguished commentator and controversialist; and published, with other works, *The Protestant Reconciler*, a plea for the toleration of dissenters, which was violently opposed and condemned to be burned. Afterward Whitby wrote in favor of views exactly opposite. In 1703 he

published *Paraphrase and Commentary on the New Testament,* a commentary of the old school of orthodoxy. But in a few years he issued his *Discourse* (1710) attacking Calvanism. Later he became a strong Arian.

WHITCHER, *hwĭch'ẽr,* FRANCES MIRIAM BERRY: American humorist: b. Whitestown, N. Y., 1811, Nov. 1; d. there 1852, Jan. 4. Her *Widow Bedott's Table Talk* first appeared in *Neal's Saturday Gazette.* After her death these and other humorous articles were collected in *The Widow Bedott Papers* (1855), and *Widow Sprigg, Mary Elmer, and Other Sketches* (1867).

WHITCOMB, *hwĭt'kŭm,* JOHN: soldier: about 1720-1812; b. Lancaster, Mass. He was col. of Mass. troops in the campaign against Crown Point 1755, and at the beginning of the revolution commanded a regt. at Boston. He was appointed brig.gen. by the provincial congress, and 1776, June 5, was made brig.gen. by the continental congress. On June 13 of the same month he was commissioned maj.gen. in the Mass. service, but soon afterward he resigned.

WHITE, a. *hwīt* [Dut. *wit;* Ger. *weiss;* Dan. *hvid;* Goth. *hveits;* Icel. *hvítr;* Skr. *çvcta,* white]: without color, or having the hue or color of pure snow, or approaching to it; transmitting and reflecting to the eye all the rays of the spectrum combined; *figuratively,* pure; innocent; unclouded; purified from sin; pale, bloodless, as, a *white* face; of silver, as, *white* money; dressed in white, as, a *white* friar; favorable, auspicious, as, a *white* day; in *OE.,* favorite, darling, as, a *white* son: N. one of the natural colors of bodies like pure snow; opposite of *black,* but, like black, not a true color; a color resulting from a certain combination of all the prismatic colors; a white man, as opposed to a black man; albuminous part of an egg; the central mark in an archery target: V. to make white in color. WHI'TING, imp.: N. a well-known sea-fish of the cod tribe; pulverized chalk cleared from stony matter, often made up into cakes. WHITED, pp. and a. *hwī'tĕd,* made white; beautifully clean and polished externally. WHITE'NESS, n. *-nĕs,* state of being white; purity; freedom from stain or blemish. WHI'TISH, a. *-tĭsh,* white in a moderate degree. WHITEN, v. *hwī'tn,* to make white; to blanch; to turn or become white. WHITENING, imp. *hwīt'nĭng:* N. pulverized chalk freed from stony matter, used for polishing and whitewashing; also spelled *whiting.* WHITENED, pp. *hwī'tĕnd,* bleached. WHITE'LY, a. *-lĭ,* in *OE.,* nearly white; pale in color. WHITE'NER, n. *-nẽr,* one who or that which makes white. WHITES, n. plu. *hwīts,* Leucorrhea (q.v.), a disease of females; fine wheat-flour; a mixture of flour and alum. WHITE'BOYS, a name given to a secret association which arose in Ireland, first in the county Tipperary, about 1760, having for members the discontented peasantry, who roamed about at night wearing *white* shirts

over their clothes, and committing dastardly outrages —the assoc. having for its object the redress of serious grievances in the exaction of tithes for a church which was not the church of the people, and in regard to the tenure of land. WHITE'BODYISM, n. the practices of the Whiteboys. WHITE-BROWN, a color between brown and white. WHITE'BAIT, a small delicate fish much prized. WHITECHAPEL-CART [from *Whitechapel*, in London]: a small spring cart, two-wheeled. WHITE CLOVER, a small species of clover bearing white flowers; Dutch clover, *Trifŏlium repens*, ord. *Legumĭnōsæ*. WHITE-COPPER, *pak-tong*, an alloyed metal of a white color, used by the Chinese, composed of copper, zinc, and nickel, with a small proportion of iron; German-silver, which is but a modification of the same alloy. WHITE CROPS, crops of grain, which assume a white color as they ripen—opposed to *green* crops, as turnips, etc. WHITE ELEPHANT, anything which can never be other than an expensive and ruinous honor or burden—referring to the rare white elephants of the king of Siam, and their expensive maintenance. WHITE FRIAR, a monk of the Carmelite order —so called from the color of their clothes. WHITE HEAT, that degree of heat given to iron in which it appears as white. WHITE HOUSE, official mansion of the president of the United States, at Washington, D. C.—named from its color (see WASHINGTON [city, D. C.]). WHITE LEAD, a carbonate of lead in the form of a white powder, much used in giving a body to paints; ceruse (see LEAD). WHITE LIE, a lie for some trivial purpose or for which an excuse can be found. WHITE LIGHT, the light which comes directly from the sun. WHITE-LIVERED, a. pale; feeble; sickly—so called from the appearance being popularly ascribed to a white liver; envious; malicious; cowardly. WHITE ROSE, the emblem of the House of York. WHITE'SMITH (see under SMITH). WHITE SQUALL, a sudden storm of wind with a bright sky. WHITE-STONE, a name given by lapidaries to limpid and colorless rock-crystal when cut for jewelry. WHITE SWELLING, a disease of the joints—so called from the altered color of the skin (see JOINTS, DISEASES OF). WHITE'THORN, n. *-thawrn*, the hawthorn, a prickly shrub, extensively employed in forming hedges; the *Cratægus oxyacan'tha*, ord. *Rosācĕæ*. WHITE-VITRIOL, sulphate of zinc (see ZINC). WHITE'WASH, n. a liquid composition of slaked lime reduced to the consistency of milk, or of whiting, size, and water, for making a large surface white, such as the walls of a house—used also as a disinfectant; a wash for making the skin fair: V. to cover with a liquid composition of slaked lime or of whitening; to give a fair external appearance to; *familiarly*, to clear a bankrupt of the debts he owes by a judicial process; to acquit a person of any dishonorable charge. WHITE'WASHING, n. the act of covering with whitewash; *familiarly*, the act of freeing or discharging a bank-

rupt from his debts by legal process. WHITE'WASHED, pp. WHITE'WASHER, one who whitewashes. WHITE'-WATER, dangerous disease peculiar to sheep. WHITE WINE, any wine similar in color to sherry, as distinguished from *red* wine, port, claret, etc. To SHOW THE WHITE FEATHER, to give proof of cowardice, referring to the pure-bred game-cock, which has no white feather on it.

WHITE, *hwīt*, ANDREW DICKSON, LL.D.: first president of Cornell University: b. Homer, N. Y., 1832, Nov. 7. He graduated at Yale 1853, with the highest honor of his class; after which he studied two years in Europe and one year at Yale, accepting a professorship of hist. and Eng. lit. in Mich. Univ. 1857. Resigning 1862, he lived in Syracuse, N. Y., and was state senator 1862-66, during which time he promoted the public-school system, and came into association with Ezra Cornell, to whose wish to found an institution in which 'any person can find instruction in any study,' he gave shape. He was pres. of Cornell Univ. 1867-85; U. S. commissioner to Santo Domingo 1871, and to the Paris exposition 1877; and U. S. minister to Germany 1879-81. In 1887 he founded the dept. of hist. and polit. science in Cornell, giving to it his rich historical library, valued at more than $100,000. He was appointed minister to Russia 1892; a member of the Venezuelan Commission, 1895-96; president of the American delegation to the International Peace Congress at The Hague in 1899; Ambassador to Germany 1897-1902. He has published *The New Germany* (1882); *On Studies in General Hist. and the Hist. of Civilization* (1885); *Hist. of the Doctrine of Comets* (1886); *History of the Warfare of Science with Theology* (1896). Other recent works are *European Schools of History; Paper Money Inflation in France; Autobiography.* He has also contributed important papers to leading periodicals, including *The Warfare of Humanity with Unrealism* and *Reminiscences of My Diplomatic Life.*

WHITE, ANTHONY WALTON: officer in the revolution: 1750, July 7—1803, Feb. 10; b. New Brunswick, N. J. His mother was daughter of Gov. Lewis Morris, of N. J., and his family wealthy. In 1775 he was appointed on the staff of Gen. Washington, with rank of maj., and promoted to lieut.col. the next year, after which he was in active service in the north until 1780, when, commissioned col., he was chief commander of cavalry in the south. Defeated at first by Col. Tarleton, he was afterward successful in several actions. On the evacuation of Charleston, S. C., 1782, he generously gave security for the pay of his troops; and the sacrifice of his property to meet the obligations, with other reverses,

exhausted his resources. After residing in New York, he returned to New Brunswick, N. J., where he died.

WHITE, Edward Douglas: jurist: 1845, Nov.—————; b. Lafourche par., La. He was educated at Mount St. Mary's Coll., Emmittsburg, Md.; at the Jesuit Coll. of New Orleans, and at Georgetown Coll., D. C.; was a Confederate soldier; studied law and was admitted to the bar; was elected state senator of La. 1874; appointed assoc. justice of supreme court of La. 1878, and 1891 was elected to the U. S. senate as a democrat. In 1894 he was appointed by Pres. Cleveland assoc. justice of the U. S. supreme court.

WHITE, Gilbert: author of the *Natural History and Antiquities of Selborne:* 1720, July 18—1793, June 26; b. Selborne, a little village in Hampshire, England. Educated at Oriel College, Oxford, he received his M.A. degree 1746, and 1752 was made a senior proctor of the univ.; was ordained and became a country curate 1753; but retired to his native village 1755. After 1758 he became curate of the neighboring parish of Faringdon; from 1784 till his death he ministered in the curacy of Selborne. He repeatedly declined valuable livings in other parishes. His charming *Natural History and Antiquities of Selborne* (1789) has made W. an indisputable English classic. Probably no book on natural history has been more frequently reprinted. It is a collection of miscellaneous jottings, unsystematized, unpretentious; but fresh, graphic, full of keen observation and luminous interpretation, and revealing throughout a delightfully loving and gentle, and, as one might say, sociable view of nature. W. had friendships with the birds, the squirrels, the plants of which he wrote. There is an ed. by Prof. Bell (1877), and one by Frank Buckland, with a chapter on antiquities by Lord Selborne (1875). W.'s MS. journal, comprising letters and poems, in 6 vols., was found 1880.

WHITE, Henry Kirke: English poet: 1785, Mar. 21—1806, Oct. 19; b. Nottingham, in which place his father was a butcher. At the age of 15 he was apprenticed to an attorney; and, while diligent in his business, his leisure was passionately devoted to literature, especially poetry. He began to attract notice by his fluency and ability as a speaker. He published 1804 a small volume of poems, which had merciless treatment from the critics, and little acceptance with the public; but secured him influential friends, notably Southey, and the Rev. Mr. Simeon, through whose influence a sizarship in St. John's College, Cambridge, was procured for him. In his studies he highly distinguished himself; but his ardor in them soon broke down his delicate constitution, and he died of consumption. The next year two vols. of his *Remains* were published by his friend Southey, with

a pleasing Memoir of the deceased poet. W.'s poetry, however, is now almost forgotten.

WHITE, HORACE: journalist: b. Colebrook, N. H., 1834, Aug. 10. In 1837 his father, a physician, removed to Beloit, Wis., but died while W. was a child. He graduated at Beloit College 1853. After his graduation he entered journalism and soon became connected with the Chicago *Tribune*. He was its editor 1864-74, and was one of the proprietors. In 1883, in association with Edwin L. Godkin, he became ed. of the New York *Evening Post*, which position he resigned in 1903. He is also an author and translator. He edited Frederic Bastiat's *Sophismes Economiques* (1869) and Luigi Cossa's *Scienza delle Finanze* (1888). He wrote *Money and Banking, illustrated by American History* (1895) and *The Roman History of Appian of Alexandria* (1899).

WHITE, JOHN (Patriarch of Dorchester): clergyman: 1575-1648, July 21; b. Stanton, St. John, Oxfordshire, England. He was educated at Winchester and at Oxford, and obtained a life fellowship at Oxford 1595. In 1606 he was appointed rector of Holy Trinity Church, Dorchester. In 1634 he became one of the Westminster Assembly of Divines, and 1645 rector of Lambeth. He advocated and efficiently promoted the colonization of New England by those who could not conscientiously conform to the usages of the established church; and 1630 founded at Mattapan, Mass., a colony of 140 Puritans from Dorsetshire and adjacent counties. He published a number of works.

WHITE, JOHN BLAKE: lawyer, artist, and author: 1781, Sep. 2—1859, Aug. 24; b. near Eutaw Springs, S. C. He began the study of law; but in 1800 went to England, and for four years studied painting with Benjamin West. He returned to the United States 1804, and in 1805 opened a studio in Boston, but soon removed to Charleston, S. C., and completed the study of law, which he ever after practiced, painting only as a relaxation. He served in the S. C. legislature a number of terms. In 1840 he received a gold medal from the S. C. Institute for the best historical painting, and 1847 was elected an honorary member of the National Acad. Among his paintings are the *Battle of Eutaw Springs* and *Battle of New Orleans*, and among his portraits those of Charles C. Pinckney and John C. Calhoun. He published several dramas. He died in Charleston.

WHITE, JOSEPH BLANCO: author and clergyman: 1775, July 11—1841, May 20; b. Seville, in Spain; son of a merchant there of Irish parentage, who had married a Spanish lady of old Andalusian family. In 1799 he was ordained a Rom. Cath. priest; but his mind was naturally restless and inquisitive; and 1810 he went to

England, and joined the English Church—though not becoming one of its priests. He became a tutor in the family of Abp. Whately 1831; and with a mind at once pious and skeptical, still in wistful quest of a religion, embraced Unitarianism, settled in London, and conducted a monthly Spanish paper, *El Espanol*. Though in literary circles recognized as a man of fine talent, and known as a contributor to periodicals such as the *Quarterly* and *Westminster Reviews*, he made no permanent impression on the public by his more formal publications. Of these the most important were: *Letters from Spain* (1822); *Practical and Internal Evidence against Catholicism* (1825); *Second Travels of an Irish Gentleman in Search of a Religion* (2 vols. 1833). He died in Liverpool, whither he had removed some years before; and four years afterward appeared his most interesting book, *The Life of the Rev. Joseph Blanco White, written by himself; with Portions of his Correspondence;* ed. by John Hamilton Thom (London 3 vols. 8vo).—His sonnet addressed *To Night* ('Mysterious Night') has been pronounced one of the finest in any language.

WHITE, Peregrine: 1620, Nov. 20—1704, July 22; b. on the *Mayflower* in the harbor of Cape Cod—the first white child born in New England; son of William and Susanna W., pilgrims on the *Mayflower*. His father died in the first dreary winter at Plymouth, and soon afterward his mother married Edward Winslow, the first provincial gov. of New England, and theirs was the first English marriage in this country. W., who was 'of vigorous and comely aspect,' became a resident of Marshfield, Mass., and the court gave him 200 acres of land there in 'consideration of his birth.' He held a number of unimportant offices, civil and military. He died at Marshfield.

WHITE, Richard Grant: Shakespearean scholar: 1821, May 22—1885, Apr. 8; b. New York. He graduated at the Free Acad. (now College) of the City of New York 1839. After study of medicine and then law, he turned to journalism; founded a paper, *The Alleghanian;* edited a comic paper, *Yankee Doodle*, 1846; was dramatic, musical, and art critic of the New York *Courier and Enquirer*, and its editor 1854-59; and of the *World* 1860-1, of which he was a founder. His letters to the London *Spectator* were helpful to the Union cause during the civil war.—Among his works are: *Handbook of Christian Art* (1853); *Shakespeare's Scholar* (1854); annotated variorum edition of Shakespeare, 12 vols. (1857-65); *National Hymns* (1861); *Memoirs of Shakespeare* (1865); *The New Gospel of Peace*, a satire (1866); *Words and Their Uses* (1870); *Every-day English* (1881); and *The Fate of Mansfield Humphrey*, a novel

(1884). He also edited the Riverside edition of Shakespeare. After his death in New York, was published *Studies in Shakespeare* (1885).

WHITE RIVER: stream in Ark. and Mo.; rising in the Ozark Mountains, flowing n.e. into Mo., then turning e. and s.e. into Ark., draining the n.e. portion of the state, and flowing s. into the Mississippi near the mouth of the Arkansas. It is 800 m. long, navigable 350 miles.

WHITE RIVER: stream in Ind.; formed by two branches, East and West Forks, which unite at the s.e. extremity of Knox co., 30 m. in a direct line from its mouth. Its course is w.s.w., and it empties into the Wabash nearly opposite Mt. Carmel, Ill., 25 m. below Vincennes. It is 50 m. long. The longer or West Fork rises in Randolph co., flows w. to Hamilton co., then w.s.w. through Marion, Morgan, Owen, and Greene cos. It is 300 m. long and navigable 150 m. or to Martinville. The East or Driftwood Fork rises in Henry co., and flows s.w. through Shelby, Bartholomew, Jackson, and Lawrence cos. It is called Blue river in the first part of its course; is 250 m. long and navigable to Rockford.

WHITE, STANFORD: architect: b. New York, 1853, Nov. 9; son of Richard Grant W. He was a pupil of the architects Charles D. Gambrill and Henry H. Richardson, and was their principal assistant in building Trinity Church, Boston, and other edifices with which the name of Mr. Richardson is especially associated. After study in Europe 1878-80, he established himself in New York, where he has furnished the architectural designs for the statues of the sculptor St. Gaudens, an example of which is the original plan for the base of the statue of Farragut in Madison Square. He is also the author of quaint designs for book and magazine covers, such as those of the *Century*. Among his latest and most beautiful architectural designs are the Washington Arch on Washington Square, facing the foot of Fifth ave., New York; and the 'Madison Square Garden' structure, at the n.e. corner of that square, the Century Club and Metropolitan Club buildings, New York, also the University of New York structures and the University of Virginia. His last professional triumph was Dr. Parkhurst's new church, Madison ave., New York, one of the world's marvels in unique church architecture; d. 1906.

WHITE, Stephen Van Culen: lawyer and financier: b. Chatham co., N. C., 1831, Aug. 1. His father belonged to the Soc. of Friends, and, refusing to act as guardsman after the Nat Turner insurrection, was obliged to leave, removing to Ill. The son graduated at Knox Coll. 1854; studied law with Benjamin Gratz Brown and John A. Kasson, in St. Louis, settling with the latter in Des Moines, Io. He soon became known for ability, especially in some cases of public interest in the U. S. court; and 1864 acted as district atty. of Io. In 1865 he opened a banking office in New York, and has distinguished himself in successful speculative enterprises. In 1886 he was elected to congress. He has long been a prominent member of Plymouth Chh., Brooklyn; is an amateur astronomer, with a private observatory; and was first pres. of the Amer. Astronomical Society.—In 1891, Sep. 22, the firm of which W. was the senior member, and which had been trying to carry through a 'corner' in September corn, was obliged to suspend, and an assignment was made to Charles W. Gould; but W.'s creditors had such entire faith in his business integrity and honor, that they offered him every chance to resume; and 1892, Feb. 1, he was restored to membership in the stock exchange. Within a year he paid every debt in full with interest.

WHITE, William, D.D.: first Prot. Episc. bishop in America who was publicly consecrated by English prelates: 1748, Apr. 4—1836, July 17; b. Philadelphia. He graduated from the college in that city 1765, and, after studying theology, was ordained deacon in England 1770, and, 16 months subsequently, priest. He then returned to this country and was successively asst. and rector of three combined parishes in Philadelphia, known as Christ Church. There the first council which included laymen met 1784, and the next year he presided at a general convention in the same place, made the first draft of the church constitution, and had large part in modifying the liturgy, also writing an address to the English prelates, soliciting a regular episcopate. Elected 1786 as first bp. of Penn., he, with Dr. Samuel Provost, of New York, was consecrated as bishop in Lambeth Palace 1787, Feb. 4. On his return he was appointed chaplain of congress, continuing as such 14 years. He was pres. of the first Bible soc. in America, that of Philadelphia, and of a prison soc., and of various charitable institutions. He died in Philadelphia. Bp. W. was a man of lovable disposition, fervent piety, zealous activity, and sound judgment. Such leadership as his was an immense service to his church in this country at a critical period of its history. The centenary of his Episc. consecration was observed in his church in Philadelphia, also in Lambeth Palace. Besides many addresses he published *Lectures on the Catechism* (1813); *Comparative View of the Controversy between Calvinists and Arminians* (1817); *Memoirs of the Prot. Episc. Church in the United States* (1820); and his opinions on exchanging pulpits with non-Episc. ministers were published 1868. See memoir by Bird Wilson, D.D., 1839.

WHITE'BAIT: a small fish, called by Valenciennes *Rogenia alba,* and for which he constituted the genus *Rogenia* as a distinct genus of the Herring family (*Clupeidæ*), but which is now regarded by naturalists as merely the fry of the herring or of similar fish. The whitebait-fishery is actively prosecuted on some parts of the British coast, particularly in the estuary of the

Whitebait.

Thames, where the whitebait is very abundant in spring and summer, beginning to appear in the end of March or early in April. Adult whitebait are caught on the coasts of Kent and Essex during winter, and in this condition are about 6 in. in length. Whitebait is found also in the Forth. It is much in request as a delicacy for the table. At the time when ordinarily captured, whitebait are only from 1½ to 4 in. in length. They are caught by means of bag nets sunk 4 or 5 ft. below the surface of the water. For several months they continue to ascend the river in shoals with the flood-tide, and descend with the ebb tide, not being able to live in fresh water. They are fried with flour or crumbs; they are often laid on a napkin and sprinkled with fine flour and a little salt, rolled about till well covered with flour, and then thrown into a pot of boiling lard, where they remain till they are of a pale straw color. The whitebait has the body more compressed than the mature herring; belly serrated; lower jaw longer than the upper; scales very soft, small, and thin, and very easily rubbed off; color silvery white, greenish on the back. The food of the whitebait seems to consist of minute crustaceans. It is probable that under the name whitebait the fry of all the British *Clupeidæ*—the pilchard, the sprat, and the shad—are indiscriminately taken and used like the fry of the herring.

WHITE'BOY: old term of endearment applied to a favorite son, dependent, or the like; a darling.—In Ireland the name was given to a member of a secret agrarian association organized about 1759-60. It was composed of starving laborers, evicted tenants, and others in a like situation, who assembled at night to destroy

the property of harsh landlords, or of their agents the Prot. clergy, of tax or tithe collectors, and of others who had made themselves obnoxious.

WHITE-BRETH'REN: in *chh. hist.*, a body of enthusiasts who appeared in Italy at the beginning of the 14th century, and, under the leadership of a priest claiming to be Elias the prophet, declared a crusade against the Turks, to obtain possession of the Holy Land. They were met at Viterbo by the papal troops and dispersed; and their leader was burned as a heretic at Rome 1403.

WHITE CAPS: in American history, a name applied to lawless bands in southern Indiana, who, from 1880, undertook the regulation of the manners and morals of that section. During the civil war the Knights of the Golden Circle flourished in the same parts. The white caps dressed differently in different parts of the country which they terrorized. Where they were regularly organized and did the most mischief they generally had nearly a full uniform or regalia. They wore white paper foolscaps, with paper masks, and coats of coffee sacking. The whole White Cap movement was borrowed from English outlawry.

WHITE'CHAP'EL, London, England: a parish and parliamentary district, e. of the nucleate city of London, one of the poorest portions of the metropolis, and formerly notorious for its criminal population. From 1888 to 1891 it was the scene of the atrocities of the mysterious Jack the Ripper. Within its boundaries are the Tower of London, and London Hospital, and it is intersected by Whitechapel Road. The name is derived from a former mediæval chapel, whence all distances e. of London were calculated. Pop. (1900) 78,758.

WHITE-CROSS SOCIETY: an association founded in England, in 1883, by the Bishop of Durham, and introduced in the United States in that year by the Rev. B. F. De Costa, rector of the Prot. Episc. Chh. of St. John the Evangelist, New York, who became a Rom. Cath. in 1899. The objects of the society are 'to urge upon men the obligation of personal purity; to raise the tone of public opinion upon the subject of morality; to secure proper legislation in connection with morality.' Those who become members of the society promise 'by the help of God,' to treat all women with respect, and endeavor to protect them from wrong and degradation; to endeavor to put down all indecent language and coarse jests; to maintain the law of purity as equally binding on men and women; to endeavor to spread these principles, and try to uplift younger brothers.

WHITE ELEPHANT: an elephant affected with albinism. Such animals, always rare, are highly esteemed by some eastern potentates, and are considered sacred in Siam, where the animal has become a national symbol, so that Siam is called 'the land of the white

elephant,' and one of the highest decorations conferred by its rulers is that of the Order of the White Elephant. A specimen purchased by the late P. T. Barnum from King Theebaw, of Burma, was brought to the United States in 1884. It stood 7½ ft. high, and the face, ears, front of trunk, fore feet, and part of breast were of a light ash color.

Figuratively, a present which does one much more harm than good, or more generally any nominal advantage which has this effect. It is reported that when in old times the ruler of Siam desired to ruin any one, he made him a present of a white elephant. The sacred elephant has an enormous appetite, and, being sacred, it would be a crime to let it die, so that the gift generally entailed ruin on the recipient.

WHITE-EYES: one of the numerous small insectivorous birds of the New Zealand region, called blight-birds there, because they feed so largely upon the plant-lice which torment garden plants and orchard trees. They belong to the genus *Zosterops,* which is variously classified by ornithologists, but seems most nearly related to the titmice. Other species are scattered elsewhere throughout the Old World tropics. All are neatly but not gaudily dressed, have in most cases a conspicuous ring of white feathers around the eye, and build pretty nests. The genus is interesting, further, from the fact that many of its species are confined to small islands, apparently affording examples of the effect of isolation.

WHITE FEATHER: a symbol of cowardice; a term introduced in the days when cock fighting was in vogue. As a thoroughbred game cock has no white feathers, a white feather was a proof that the bird was not game.

WHITEFIELD, George: English evangelist, founder of the Calvanist Methodists: b. Gloucester 1714, Dec. 16; d. Newburyport, Mass., 1770, Sep. 30. He was sent to the grammar school of Saint Mary de Crypt at Gloucester, and at 18 entered as servator at Pembroke College, Oxford, where he became acquainted with the Wesleys, and joined the small society which procured them the name of Methodists. Hearing of his devotional tendencies, Dr. Benson, bishop of Gloucester, made him an offer of ordination at 21, which he accepted; and he was ordained a deacon in 1736. Such was his powerful and exciting preaching, that, after his first sermon at Gloucester, a complaint was made to the bishop that he had driven several people mad; on which the prelate observed that he hoped the madness would not be forgotten before the next Sunday. He for some time supplied a curacy at Dummer, in Hampshire but the next account sent him by the Wesleys of their progress in Georgia excited in him a desire to assist in their labors, and he arrived at Savannah in May, 1737. Observing the deplorable want of education in the colony, he projected an orphan-house,

for which he determined to raise contributions in England, where he arrived in the beginning of 1739. Although discountenanced by many of the clergy, Bishop Benson did not scruple to confer on him priest's orders; and on going to London the churches in which he preached were incapable of holding the crowds assembled to hear him. He now adopted the practice of preaching in the open air, which he seems first to have carried out at Kingswood, near Bristol, among the colliers, on whom his discourses produced a surprising effect, and whose vicious manners and habits he visibly improved. He afterward preached in the open air in Bristol, and in Moorfields, Kennington, and other places in the neighborhood of London, to vast assemblages of people. In Aug., 1739, he again embarked for America, and made a tour through several of the provinces, where he preached to immense audiences, with an effect vividly portrayed in the autobiography of Benjamin Franklin. He arrived at Savannah in Jan., 1740, where he laid the foundation of the orphan-house, and after making another extensive tour, returned to England, in March, 1741. During his absence his cause had been declining at home, and the differences between him and Wesley on the doctrines of election and reprobation deprived him of many followers. After visiting many parts of England, Scotland, and Wales, where he married in 1741, he again returned to America (1744), and remained there nearly four years. His preaching met with great opposition in New England at this time and Harvard College put forth a 'testimony' against him. Returning to England in July, 1748, he was soon after introduced to the Countess of Huntington, who made him one of her chaplains. A visit to Ireland and two more voyages to America followed, and for several years his labors were unremitting. He preached at Exeter, N. H., the day before his death, and also at Newburyport. He is buried beneath the pulpit of the Federal Street Church at Newburyport. His works were published in 1771-2.

WHITEFIELDIANS, n. plu. *hwīt-fēld'ĭ-anz:* in *chh. hist.,* the followers of George Whitefield, who separated from the Wesleys 1741 on the question of personal election, and established the Calvanistic Methodists. Since 1748, when Whitefield became chaplain to the Countess of Huntington, the name has fallen into disuse.

WHITE'FISH: a fish of the genus *Coregonus,* family *Salmonidæ.* Those members of the genus which are more especially called whitefish are the Common Whitefish (*C. clupeiformis*), of the Great Lakes and n.; the Menomonee Whitefish (*C. quadrilateralis*), New Hampshire to Lake Superior and n.; the Sault or Musquaw River Whitefish (*C. Labradoricus*), White Mts. to Labrador and Lake Superior; the Mongrel Whitefish (*C. tullibee*), of the Great Lakes, scarce; and *C. Williamsoni* of the Rocky Mts. All are excellent food-fishes, and sim-

ilar in color—pale or bluish, with the sides white; and all are variable in characters. To distinguish them accurately, see Jordan's *Manual of the Vertebrates of the Northern U. S.*, and G. Brown Goode's publications.

WHITE FLUX. See FLUX.

WHITE FLY: a minute insect of the family *Aleyrodidæ*, closely allied to the aphids and coccids, which infest the leaves of plants, usually on the lower side, and are pests in greenhouses. They are covered with a whitish mealy secretion, and when young also secrete wax. The group is not a large one, and does not do much harm to fruit or forest trees, except that one species (*Aleyrodes citri*) has been prevalent in Florida orange groves since about 1890. The evil they do results not only from their sucking the nutritive juices of the plants, but from the spread of smut-fungus which is promoted by their presence.

WHITE FRIARS: a name formerly given to the friars of Our Lady of Mount Carmel, because they wore a white scapular and cloak over their brown habit.

WHITE GUNPOWDER: mixture used formerly in blasting, but now little used, because of the danger attending its preparation, and the facility with which it explodes by friction. Its ingredients are chlorate of potash, dried ferrocyanide of potassium, and sugar.

WHITE'HALL, London, England: a street leading from Parliament Square to Trafalgar Square, containing several public offices, and named after a palace that once stood here. The building known as the Horse Guards, the office of the commander-in-chief of the army, is so called in consequence of being the station where that part of the troops usually do duty. The treasury, near the Horse Guards, is built on the site of part of the old palace; the First Lord of the Treasury, however, has his official residence in Downing Street, where also the cabinet meets. The Admiralty Office contains the offices connected with the administration of the naval affairs of the country. The original Whitehall succeeded a mansion built by Hubert de Burgh before the middle of the 13th century. It afterward came into the possession of the archbishops of York, was inhabited by Wolsey (under the name of York Place), then passed to Henry VIII., and was called Whitehall. Charles I. was executed in front of Whitehall, and he was led to the scaffold out of one of the windows. Oliver Cromwell died in Whitehall. In 1697 the building was destroyed by fire, except the banqueting hall, which had been added by James I., according to a design of Inigo Jones, in 1619. This portion still remains, and chiefly consists of one room, of an oblong form and 40 ft. high. The ceiling, representing the apotheosis of James I., was painted by Rubens, and was retouched by Cipriani. This build-

ing was long a royal chapel, but it now contains the museum of the Royal United Service Institution.

WHITEHALL: city in Greene co., Ill.; on the Chicago & A., and the Chicago, B. and Q. railroads; about 25 m. s.w. of Jacksonville and 63 m. n. of St. Louis. It is in an agricultural and stock-raising region, and in the vicinity are deposits of fire clay. The chief manufactures are flour, sewer-pipe, tiles, stoneware, and machinery. Its shipping trade is chiefly in farm and dairy products, live-stock and clay products. There are six churches, a high school, and library. The two banks have a combined capital of $100,000. Pop. 2,100.

WHITE'HALL: post village in Whitehall tp., Washington co., N. Y.; at the head or s. end of Lake Champlain; 65 m. n.n.e. of Albany, 24 m. w. of Rutland, Vt.; on the Delaware and Hudson Canal Co.'s railroad. It is the n. terminus of the Champlain canal, which connects the lake with the Hudson at Troy. It was founded 1761 by Maj. Philip Skene, and called Skenesborough. It is picturesquely situated at the foot of Skene's Mt., and at the mouths of Wood creek and Pawlet river; and in summer steamboats ply daily between it and other lake-ports. The falls in the streams furnish excellent water-power. In 1812 it became a military depot, and has ever since had an important transport trade. Pop. (1900) 4,377; (1910) 4,917.

WHITEHAVEN, *hwīt-hā'vn:* seaport and parliamentary borough of England, in the county of Cumberland; near the point where the Solway Firth joins the Irish Sea; 41 m. s.w. of Carlisle by railway, 304 m. n.w. of London. It contains a market-house, custom-house, baths, and a theatre, the West Cumberland Infirmary, and a free library. The sources of the prosperity of the town are its vicinity to extensive collieries—one of which extends beneath the town and out under the sea for 1½ m.—also the abundance and richness of the hematite iron ore found in the neighborhood. Coal and iron mines are numerous; there are iron-smelting works, and iron and brass foundries—the manufactured iron being shipped mostly to the Welsh and Irish markets. There are dry-docks for building and repair of vessels; and rope-making and the manufacture of thread and sail-cloth are important branches of trade. The harbor is commodious, but becomes nearly dry at low water. It is protected by two stone piers, 965 and 918 ft. long respectively. Pop. 20,000.

WHITE HELLEBORE: a liliaceous plant of the genus *Veratrum,* a source of insect-poison, the principle of which is the alkaloid veratrin.

WHITE HOUSE: the official residence of the president of the United States, in Washington, D. C. The name arose from the fact that the building is constructed of freestone and painted white. It is 170 ft. long,

86 ft. deep, and two stories in height. It has an Ionic portico, the main entrance faces n. Reception rooms are on the first floor and the private apartments of the president are on the second floor. Among the reception rooms are the blue room used for diplomatic functions, the east room used for public receptions, and the red and green rooms. The original official residence for the president was begun in 1792; it was first occupied by Adams, in 1800. In 1814 it was burned by the British, and four years later was rebuilt. In 1903 executive offices connected with the main building were built on the grounds. Presidents Harrison and McKinley used for the official name, 'Executive Mansion'; President Roosevelt changed to the old name, White House.

WHITE LADY: an apparition which figures in the legends and traditions of various countries, as presenting itself to give warning of death and other momentous events in royal and titled households. The White Lady is supposed to be an ancestress of the family she visits, and the association of such a legend with a family name is regarded as a guarantee of noble and ancient lineage. The imperial house of Hohenzollern has its White Lady, and Hampton Court, England, is said to be invaded at times by a supernatural visitor, although there seems to be some doubt whether it is a White Lady or the ghost of Henry VIII.

The earliest historical instance of the apparition is recorded as having occurred in the 15th century, and is celebrated under the name of Bertha of Rosenberg, in Bohemia. Similar appearances are said to have been witnessed in the Schloss at Berlin, one as recent as 1879.

As a considerable number of estates of European titled personages are passing into new and plebeian ownership the question has arisen whether the White Lady is transferred with the property, or follows the old family into poorer quarters in some city tenement.

WHITE LEAD: a white pigment very largely used in painting. Many processes have been devised for its manufacture, but only the important ones will be described here. The old Dutch method was to expose sheet lead in coils, placed in earthenware jars partly filled with vinegar, to the combined action of air, moisture, and carbonic acid gas. This was done by immersing the jars with their contents in decomposing horse manure which furnished the heat and carbonic acid gas necessary for the process. The English process, which is the one by which most of the white lead is made, differs from the Dutch process by the use of fermenting tan bark instead of manure. The pots containing the lead and dilute acetic acid or vinegar are piled in rows in the so-called stacks and surrounded with the fermenting tan bark. After about three months the lead is removed and purified. The process is slow and the methods of purification dangerous to the workmen, but the result-

ing white lead is of the best quality. In the French method a solution of basic lead acetate is first prepared by the action of an impure acetic acid on litharge or lead oxide. Carbonic acid gas is then passed through this solution and the white lead precipitated.

White lead is a basic carbonate of lead of somewhat variable composition. That formed by the Dutch and English processes may be represented by the formula $2PbCO_3.Pb(OH)_2$.

WHITE LEAGUE, The: in American history, a popular name for a semi-military organization, gathered to repress the negroes of the state of Louisiana, who, it was asserted, were meditating insurrection. The organization had its inception in New Orleans, in 1874, and on the refusal of the city authorities to allow the landing of a cargo of firearms, which the league had imported from New York, a riot ensued which resulted in more than 100 deaths. The league afterward became a powerful factor in Louisiana politics.

WHITELOCKE, *hwīt'lok,* Bulstrode: English statesman and lawyer: 1605, Aug. 2—1676, Jan. 28; b. London; son of Sir James Whitelocke (1570-1632) and Elizabeth Bulstrode. He was educated at Merchant Taylors' School, and at St. John's College, Oxford, which he left before taking a degree, to study law at the Middle Temple; 1626 was engaged in a subordinate legal position in the impeachment of the Duke of Buckingham; 1640 was elected to the Long Parliament for Great Marlow; 1640-1, chairman of the committee for conducting the impeachment of Strafford, and outlined the charges against him; 1641-2, parliamentary commissioner to treat with Charles I. at Oxford. He disapproved of and refused to take part in the trial of the king. In 1643 he was a member of the Westminster Assembly of Divines, and opposed the adoption of the Presb. doctrine and discipline; 1644 gov. of Windsor, and as gov. saved the royal library and medals from dispersion; 1653 ambassador to Sweden to negotiate a treaty with Queen Christina; commissioner of the treaury 1655; speaker of the house of commons 1656, and member of the house of lords 1657; commissioner of the great seal to Richard Cromwell, but helped to depose him; pres. of the council of state during the interregnum. At the restoration his name was included in the Act of Oblivion, but he was left undisturbed at Chilton Park, his Wiltshire seat, where he died. He left valuable MSS., of which *Memorials of English Affairs from the Beginning of the Reign of Charles I. to the Restoration of Charles II.* was published 1682, new ed. 1732, last ed. 1852.

WHITE METAL: a term used for an alloy of lead, antimony, and tin used for bearings in machinery. Also applied to many other alloys that have a white color.

WHITE MOUNTAINS: mountain chain of N. H., re-

garded as an outlying range of the Appalachians; having its n. extremity at the head-waters of the Aroostook river, Maine, where its first summit is Mt. Katahdin; and extending in a broad plateau, 1,600 to 1,800 ft. high, w.bys. nearly across New Hampshire, where it has 20 bold peaks, with deep, narrow gorges, wild valleys, beautiful lakes, lofty cascades, and torrents, forming the 'Switzerland of America,' a favorite resort of summer tourists. The peaks cluster in two groups—the eastern or White Mt. group, and the w. or Franconia group—separated by a table-land 10 to 15 m. wide. Mt. Washington (the highest summit of either group, and the highest in the region of the United States n. of N. C. and e. of the Rocky Mts.) is 6,288 ft. high; it has a good carriage-road, and a hotel on its summit. Mt. Jefferson is 5,794 ft., Mt. Adams 5,714, Mt. Madison 5,365 and Mt. Monroe 5,384 ft. high. These peaks, called the Presidential group, are the principal, though there are many others included in the White Mts. Of the Franconia Mts., Mt. Lafayette, 5,290 ft. high, is the only one that exceeds 5,000 ft. The White Mts., with an entire area of more than 800 sq.m., furnish the chief sources of the Connecticut, Merrimac, and the Androscoggin rivers. The rocks are ancient metamorphic, with naked granite and gneiss. The Ammonoosuc river falls 5,000 ft. in 30 m., the Androscoggin 200 ft. in a mile. Five narrow and precipitous notches seem to have been rent in the mountains, and give passage to as many rivers.

WHITE PLAINS: village, county-seat of Westchester co., N. Y.; on the Harlem division of the New York Central and Hudson River railroad; about 20 m. from the central part of New York city. It is in an agricultural section, and has several manufactories. It has a high school, opened in 1894, graded elementary public and parish schools, Saint John's Academy for Boys, Good Counsel Training School, several private schools, and a public library. Bloomingdale Asylum for the Insane occupies a prominent position overlooking the village. The village owns and operates the water-works. The government is vested in a president and board of trustees. Pop. (1900) 7,899; (1910) 15,949.

White Plains and vicinity were the scenes of many battles and skirmishes during the revolution. Fortifications or their ruins were to be seen on all sides. On Oct. 21 Washington established his headquarters at White Plains. On the evening of Oct. 27 Haslett with about 1,600 American troops had taken possession of Chatterton Hill, a commanding eminence on the west side of the Bronx; and on the morning of the 28th, reinforced by a small additional force under McDougall and two pieces of cannon under command of Alexander Hamilton, he fortified his position as well as time would allow. On the morning of that day Howe advanced with

his forces in two columns (numbering about 13,000 men) upon the American army posted along the Bronx. Perceiving the importance of the position on Chatterton Hill, and regarding it as the only assailable point of the American army, Leslie was sent with a strong detachment to cross the Bronx and attack it in front, while Rall with a Hessian regiment was ordered to cross the river a quarter of a mile below and attack Haslett in flank. The hill was carried with great difficulty, the Americans retreating in good order and without being pursued. The British troops rested that night on Chatterton Hill. The next day, Oct. 29, a skirmish took place between the two armies; but Howe, finding the Americans still too strongly posted to be attacked with safety, waited for reënforcements. These arrived on the evening of the 30th, but a storm coming on, the Americans took advantage of it and withdrew to the still stronger position of Newcastle, 2 m. above, which they had previously fortified. Afraid to attack them in this position, Howe fell back to the junction of the Harlem and Hudson rivers, and encamped on Fordham Heights; and Washington withdrew his army leisurely into New Jersey and made his headquarters at Hackensack. The loss of the Americans in the battle of White Plains and the skirmish of the succeeding day was nearly 300 in killed, wounded, and prisoners, and that of the British about the same.

WHITE QUAKERS: a small community of Quakers in Dublin, Ireland, so-called from dressing in white. They are seceders from the main body, and are said to be Antinomian in their belief.

WHITE RIBBON GOSPEL ARMY: a Christian society which originated in England in 1884, and has since extended to the United States. It gives special attention to inculcating moral purity.

WHITE RIVER: in Arkansas, has its rise in the Ozark mountains, in the n.w. part of the state, flows n.e. into Missouri, forming a large curve, and entering Arkansas again in Marion co., then flows s.e. to the Mississippi river. It enters the Mississippi through several channels, some of which pass through the mouth-channels of the Arkansas river. Except in the highlands of the Ozark mountains, the greater part of the course of the river is through marshy forest land. It is navigable to Batesville, about 380 m. The total length is 800 m.

WHITE RIVER: in Indiana, the chief branch of the Wabash in the state, is formed by the confluence, in Pike co., of the east and west fork, which have their rise near the eastern boundary of the state. From the junction of the two forks to the mouth of the White, where it enters the Wabash, is 50 m.; total length from the source of the west fork is 350 m. The river is

navigable to Martinsville on the west fork and to Rockford on the east fork.

WHITE RIVER JUNCTION: village in Windsor co., Vt.; on the Connecticut river at the mouth of the White river, and on the Central V., the Boston and M., and the Woodstock railroads; about 65 m. s. by e. of Montpelier and 14 m. e. by n. of Woodstock. It is a commercial centre for a large agricultural region in both Vermont and New Hampshire. White River Junction is in the town of Hartford, and the government census does not give the population of the village separate. Pop. 3,817.

WHITE SEA: northern Russia, a large gulf opening into the government of Archangel, between the Kola peninsula on the w. and the Kanin peninsula on the e. Near its mouth, and on the eastern side, is a branch of it called the Gulf of Mezen, which receives the waters of the river Mezen, and the inner part of the sea sends off three large arms, namely, the Gulf of Kandalak, penetrating n.w. into Lapland, the Gulf of Onega, receiving the river Onega, and the Gulf of Archangel, into which flows the Northern Dwina. Of the islands in the sea Solovetskii is the largest. The White Sea is comparatively shallow, and is frozen over from Oct. to May. Archangel, at the mouth of the Northern Dwina, is the leading port of northern Russia, and other ports on the shores of the sea are Onega and Kem. Canals connect the White Sea basin with the basins of the Caspian, Baltic, and Black Sea.

WHITE SULPHUR SPRINGS: city, county-seat of Meagher co., Mont.; about 95 m. e. by s. of Helena. It is reached by stage from the Northern Pacific railroad, a distance of about 40 m. It is the commercial centre of a large agricultural, stock-raising, and mining region, and is noted for its thermal springs. Pop. 446, which includes only those within the limits and not the number who transact business in the city.

WHITE SULPHUR SPRINGS: a district in Greenbrier co., W. Va.; on the Chesapeake and Ohio railroad; about 230 m. w. by n. of Richmond and 90 m. w. of Staunton. The locality has long been noted for its medicinal springs. The temperature of the water is 62° F. It is a famous health-resort. Pop. 1,680.

WHITE-SWELLING: any severe disease of the joints resulting from chronic inflammation in the bones, cartilages, or membranes. The knee, ankle, wrist, and elbow are the joints most subject to this form of disease. It is distinguished from simple inflammation of the synovial membrane (synovitis) by the fact that the synovial membrane passes into pulpy degeneration. Amputation is frequently necessary. The disease may be local or constitutional in origin, being in the latter case due to rheumatism, gout, syphilis, pyæmia, etc.

WHITE'STONE: in New York city, borough of Queens, N. Y. The village was a place of importance, on account of its good harbor, and its position near the eastern entrance to New York harbor. It is near the United States military post at Willett's Point, and Fort Schuyler, on Throgg's Neck. Pop. 3,000.

WHITE'THROAT: a bird, either of two species of Old World warblers—*Curruca cinerea*, the greater, and *C. sylvicila*, the lesser whitethroat; or a hummingbird (*Leucochloris albicollis*) of Brazil; or a white-throated sparrow (*Zonotrichia albicollis*), commonly known in the eastern United States, where it is a migrant, as Peabody-bird.

WHITEWASH: a milky fluid produced by mixing good slaked lime with water. Used as a cheap coating for walls, fences, etc. When mixed with a little size and sometimes colored it is used on interior walls under the name of calcimine.

WHITE'WATER: city in Walworth co., Wis.; on the Whitewater river, and on the Chicago, Milwaukee and St. Paul railroad; about 46 m. s.e. of Madison and 50 m. s.w. of Milwaukee. It is in an agricultural and stock-raising region, and has creameries, paper mill, wagon works, sash and door factories, flour mill, machine shops, and furniture factory. It has a state normal school, a high school, opened in 1886, public and parish schools, and a public library. The two banks have a capital of $150,000. Pop. 3,450.

WHITFIELD, *hwĭt'fēld*, HENRY: clergyman: 1597-1658; b. England. He received a university education, and as his father had destined him for his own profession, the law, he was entered at the Inns of Court, but, following his own preference, he took holy orders and became minister at Ockley, Surrey. He was a friend and protector from persecution of the Nonconformists, and after 20 years in the Established Church publicly joined them, and was himself persecuted for refusing to read the *Book of Lawful Sunday Sports*. In 1637, with Gen. Theophilus Eaton and many of his former church, Whitfield came to this country, purchased from the Indians the site of Guilford, Conn., and began a settlement there; he also aided in the founding of the New Haven colony. He devoted the large fortune which he inherited to charitable and public uses. In 1650 he returned to England and became minister at Winchester, where he died. He was author of a number of religious works.

WHITGIFT, *hwĭt'gĭft*, JOHN, D.D.: third Prot. archbishop of Canterbury: 1530 (or 33)—1604, Feb. 29; b. Great Grimsby, Lincolnshire; son of a merchant, of a family long established in Yorkshire. His early years were passed within the Abbey of Wellow, near Grimsby, of which his uncle was abbot; and from that he went

to St. Anthony's School in London, a religious house then in great reputation. About 1548 he was entered at Queen's College, Cambridge. After a short time he removed to Pembroke Hall, of which he continued a member till 1555, when he was elected a fellow of Peterhouse. He took orders 1560; and as he showed remarkable talent for preaching, the bishop of Ely appointed him his chaplain and gave him the living of Feversham. In 1563 he was appointed Lady Margaret prof. of divinity, in which office his lectures gave great satisfaction. In 1567 he became master of Pembroke Hall; and in the same year Queen Elizabeth, who admired his preaching and had made him one of her chaplains, appointed him master of Trinity College. About this time he obtained also the regius professorship of divinity and took his doctor's degree. He was appointed dean of Lincoln 1571, bishop of Worcester 1577, and archbishop of Canterbury 1583. He at one time held simultaneously—under a dispensation from the archbishop—the deanery of Lincoln, the mastership of Trinity, the regius professorship of divinity, and the living of Feversham; and the dispensation enabled him to hold with these any other benefice whatever. This cannot have been often paralleled, even in the history of pluralities. Of course the man so favored had rendered, and was using his abilities in rendering, considerable services to the church and to the crown.

His first work, on becoming master of Trinity, was on a revisal of the statutes of the university. He obtained such powers for the heads of houses as afterward enabled them to eject from the Lady Margaret professorship the able and energetic Puritan, Cartwright, because of his Calvinistic creed. He had a pulpit controversy with Cartwright, in which, whether Whitgift's arguments were or were not as effective as Cartwright's, Whitgift had at least the advantage of a position in which he was able to enforce them with arbitrary authority: Cartwright was deprived of his professorship 1570; and Whitgift deprived him of his fellowship in the univ. 1571. Whitgift afterward (1572), at the request of Archbishop Parker, published an answer to an 'Admonition of Parliament' (drawn up by a clergyman named Field) presented to the house of commons on behalf of the Puritans, in which was maintained their view that, in matters of doctrine and discipline, the church should admit nothing as authoritative but what was contained in Holy Scripture. It has always been held by those of high-church views that, in this reply, Whitgift vindicated the position of the Anglican Church against the Puritans with no less ability than Bishop Jewell showed in defending it against the Romanists. He was answered by Cartwright on behalf of the Puritans; he replied, and Cartwright rejoined; and as the works on either side were revised by the most learned and eminent

men of the two parties, they give an excellent view of the state of opinions in the Anglican Church at this time. After becoming primate, Whitgift labored assiduously to secure uniformity of discipline in the church. He had the full confidence of Queen Elizabeth, who placed all the church patronage of the crown, including the bishoprics, in his disposal; and he was armed with full powers for carrying out his design, which was hers also. He required the clergy not only to subscribe to the royal supremacy, the liturgy, and the thirty-nine articles of the church, but also to a set of additional articles framed mainly with the view of purging the church of Puritanism. The bishops were required to administer those tests; and the clergymen who refused to accept them were deprived of their livings. This measure was harshly conceived; yet Whitgift is said to have been a kindly man; doubtless in his severe policy against the Puritans he gave extreme application of his own views in obedience to the behests of his strenuous sovereign, who would brook no dissent. He was made a privy councilor in 1586, and in that capacity drew up a set of statutes for cathedral churches, to make their services conform to the principles of the Reformation. He was offered the chancellorship by Queen Elizabeth, but declined the office. In 1593 Whitgift procured the passing of an act making Puritanism an offense against the statute-law of the realm. On the accession of King James he seems to have been alarmed for the stability of the system which he had spent his life in rearing; and though the monarch treated him with great observance, anxiety on this account is said to have hastened his death by paralysis. He is undoubtedly entitled to rank with the ablest and most distinguished prelates of the English Church. Archbishop Whitgift was very hospitable: he was also stately in his style of living—sometimes making his visits to large towns with a retinue of 800 horsemen. He founded a magnificent hospital and a grammar school at Croydon.

WHITHER, a. *hwĭth'ėr* [OE. *whider;* AS. *hwider,* whither]: to what or which place. WHITH'ERSOEV'ER, ad. *-sō-ĕv'ėr,* to whatever place.

WHITING: town in Lake co., Ind.; on Lake Michigan, and on the Pennsylvania railroad; about 16 m. s.e. of Chicago. It has a good harbor and steamer connections with the Lake Michigan ports. It has a large oil refinery, machine shops, and several industrial establishments connected with refining and shipping petroleum and with shipping farm products. In 1900 (government census) the manufacturing establishments, though small in number, were capitalized for $12,701,598, and the value of the annual products was $16,674,285. Pop. (1900) 3,983; (1910) 6,587.

WHITING, *hwī'tĭng:* fish of the genus *Menticirrhus*

and family *Sciænidæ*. The whiting of Maryland to Brazil (*M. Americanus*), with outer teeth of the upper jaw very strong, is silvery gray, with faint oblique bars. The Silver or Surf Whiting of Virginia to Texas (*M. littoralis*) is silvery gray, with the tip of the caudal fin black. These belong to a family with ctenoid (comb-like) scales. North of Virginia and in England the name whiting is given to species in the Cod family (*Gadidæ*) with cycloid scales. The whiting otherwise known as Silver Hake or Stock-fish (*Merluccius bilinearis*), Virginia, and n., is 2 ft. long, the top of the head with W-shaped ridges, and the angle of the mouth black. This species and the European whitings (genus *Merlangus*) differ from the cod, haddock, and their congeners (*Gadus* or *Morrhua*) in having no barbule on the lower jaw. The Common Whiting (*Merlangus vulgaris*) is abundant on many parts of the Brit. coast. It sometimes (and not rarely) attains a weight of 3 or 4 lbs., and a whiting of 7 lbs. has been taken. The color is dusky yellow on the back, sides paler, belly silver white; there is a black spot on the upper part of the root of the pectoral fin. It is in high esteem for the table. The flesh is of pearly whiteness, whence the English name. Great numbers of small whitings are sent to market, salted, and dried, under various names. Another species of whiting, Couch's whiting (*Merlangus albus*), is abundant in the Mediterranean. The Coal-fish and the Pollack also belong to the genus *Merlangus*.

WHIT'ING: impure carbonate of lime, prepared by grinding and then washing chalk, so as to separate the coarser particles from the finer, which are collected in masses and dried. It is extensively used for size-painting, and for cleaning plate, etc.; and, on emergency, may be employed as an antidote (in suspension in milk) in cases of poisoning with oxalic or one of the mineral acids.

WHITLOW, n. *hwĭt'lō* [prov. Eng. *whickflaw*—from prov. Eng. *whick*, quick, alive, and Eng. *flaw* (see QUICK and FLAW)]: a flaw or sore about the quick of the nail; paronychia; also a name applied to a disease in the feet of sheep.—*Whitlow*, in the human subject, is a painful inflammatory affection of the phalanges of the fingers, almost always proceeding to suppuration. There are several varieties, according to the texture primarily attacked; thus, whitlow may be situated in the skin, in the cellular (or connective) tissue beneath the skin or under the nail, in the tendons or tendinous sheaths running along the fingers, or in the periosteum. If in the skin, vesicles appear, which soon discharge pus, after which relief is rapidly afforded. Such cases require little care or attention, and give rise to hardly any constitutional disturbance. If the cellular tissue is the primary seat of inflammation, there is a painful sensation of tenseness and throbbing of the part, and often

considerable febrile disturbance, until the pus can be evacuated. Though this form is painful, no serious trouble is to be apprehended. When, however, the tendons and their sheaths, or the periosteum, are affected, a much more serious form of whitlow is developed, for which see TENDON: in this form the suppuration may extend up the arm and occasion destruction of the joints, and even death.

Whitlow may originate either spontaneously, or after an external injury, such as a prick from a needle, thorn, etc. In treatment of the milder forms, the finger or thumb should be held for half an hour or longer in water as hot as can be borne, and then rubbed with lunar caustic. When matter shows itself, an incision should be made, to permit its escape. Even if suppuration has not taken place, a free incision into the inflamed part often gives great relief.

WHITMAN: town in Plymouth co., Mass.; on the New York, New Haven and Hartford railroad; about 15 m. n.w. of Plymouth, and 20 m. s. by e. of Boston. The chief manufacturing establishments are boot and shoe factories, paper and wood box factories, tack and nail works, and steel shank factory. In 1900 (government census) Whitman had 65 manufacturing establishments which were capitalized for $2,054,815, and in which were 2,161 employees to whom were paid annually $1,192,401. The value of the annual finished products was $5,009,786. It has seven churches, public schools, and a public library. The government is administered by annual town meetings. The town was originally a part of Abington, but was set off in 1875 and incorporated as South Abington. In 1886 the present name was adopted. Pop. (1900) 6,155; (1910) 7,292.

WHITMAN COLLEGE: located at Walla Walla, Wash. It was founded by Cushing Ells as a memorial to Marcus Whitman; it was chartered in 1859 as Whitman Seminary, but was not open to students till 1866; in 1882 the courses were extended, the standard raised, and a new charter obtained in 1883 by which the name was changed to Whitman College. For several years the college was aided by the American College and Education Society of Boston, in 1893 Dr. D. K. Pearsons of Chicago offered to give $50,000 if the college would raise $150,000 for the same purpose. The conditions were met, and in 1902 Dr. Pearsons added another $50,000 to the endowment. Women are admitted on equal terms. The campus consists of 27 acres near the centre of the city and includes a small lake. The buildings include the Whitman Memorial, Billings Hall (men's dormitory), Reynolds Hall and Prentiss Hall (women's dormitories), Association Hall, the Conservatory, and the gymnasium. The library contains 11,200 volumes; the students number 355.

WHIT'MAN, MARCUS, M.D.: early missionary in Oregon: 1802, Sep. 4—1847, Nov. 29; b. Rushville, N. Y. He graduated at Berkshire (Mass.) Med. Institute. While practicing medicine in Wheeler, N. Y., he was enlisted by the Rev. Samuel Parker to accompany him as missionary of the Amer. Board to Oregon 1834–5. Returning for reinforcements, he made the famous first journey with a wagon to Or. 1836, his wife and Mrs. H. H. Spaulding being of the party. His mission was established at Waiilatpu. Finding that the Hudson's Bay Company were moving to occupy Or. with emigrants from Manitoba, he made a perilous journey on horseback over the mountains, in winter, to Washington, to warn our government against yielding to Great Britain that region, then largely believed to be both worthless and inaccessible. On his way eastward, he stimulated emigration from the border states: see OREGON. After 11 years of useful work, he, with many others at the mission, was murdered by Indians. A monument to him, and a county, town, and college at Walla Walla, named for him, show the appreciation of this hero in the great state which he saved to the American Union.

WHIT'MAN, WALT: poet: 1819, May 31—1892, Mar. 26; b. West Hills, Long Island, N. Y. He studied in the public schools of Brooklyn and New York; at 16 years taught school, in the summer seasons learning the printer's trade; first contributed prose to the Brooklyn *Patriot* and poetry in the usual style to the New York *Mirror;* in 1839 founded *The Long Islander* at Huntington, L. I.; for two years edited *The Brooklyn Eagle;* contributed to the *Democratic Review,* and worked with the party which it represented, but in 1848 joined the 'free-soilers.' After travelling s. and w., he returned to Brooklyn, assisted his father in carpentry, and published *Leaves of Grass* 1855. In this volume, as in his longshoreman style of dress at the time, he discarded all conventionalities, and he indulged himself in chaotic literary form and what is commonly regarded as immodest speech. Emerson welcomed it in extravagant words, followed later by expressive silence. In time, the book and other deliverances came to be widely admired in this country and England by those who welcome anything bizarre. Whitman was personally of a noble nature, and certainly had a true vein of poetry and a large way of looking at life and American civilization, but preferred the shovel to the chisel as an instrument of art. His humane service as volunteer nurse in the war, 1862–65, led to ill-health, and to paralysis in 1873. He died in Camden, N. J. His publications include: *Drum-taps* (1865); *Memoranda during the War* (1867); *Democratic Vistas* (1870); *Passage to India* (1870); *Specimen Days and Collect* (1883); *November Boughs* (1885); *Sands at Seventy* (1888); and *Good-bye, My Fancy* (1891).

WHITNEY, *hwĭt'nĭ*, Adeline Dutton (Train): author: b. Boston, 1824, Sept. 15; d. Milton, Mass., 1906, Mar. 21. She was educated in Boston. She contributed largely to periodicals, especially for children, and published several volumes of poems and many novels. Among her stories are: *Footsteps on the Seas*, a poem (1857); *Mother Goose for Grown Folks* (1860); *Boys at Chequasset* (1862); *Faith Gartney's Girlhood* (1863); *A Summer in Leslie Goldthwaite's Life* (1866); *Patience Strong's Outings* (1868); *Hithertos A Story of Yesterdays* (1869); *We Girls* (1870); *Real Folks* (1870); *Pansies*, verse (1872); *The Other Girls* (1873); *Sights and Insights* (1876); *Odd or Even* (1880); *Bonnyborough* (1885); *Bird Talk*, verse (1887); *Ascutney Street* (1890); *A Golden Gossip* (1891); *Friendly Letters to Girl Friends* (1897); etc.

WHIT'NEY, Eli: inventor of the cotton-gin: 1765, Dec. 8—1825, Jan. 8; b. Westborough, Mass. His mechanical skill, together with school-teaching, enabled him to support himself in Yale Coll., graduating 1792. With the expectation of teaching, he went to Georgia; but began the study of law, the widow of Gen. Nathanael Greene having invited him to become an inmate of her household. She soon perceived his mechanical genius, and directed his attention to the need of some device to separate cotton-seed from the fibre, a pound a day being all that was cleaned by the ordinary plantation-hand. He set himself to work, making his own tools, and even manufacturing the wire needed, and within the year of his arrival, 1792, turned out a machine substantially the same as the improved ones now in use. It consisted of circular iron combs set thickly around a revolving cylinder, and playing into a finely grated rack containing the cotton; the seed was thus detained in the rack, and the gathered fibre pulled through was separated from the cylinder combs by a revolving set of brushes, while a fan also drove into a receptacle any loose fibres. It was sought to keep the invention secret until a patent was obtained, but the machine was stolen and copied—some copies having toothed plates in place of the wire combs. Whitney maintained his claim in a multitude of lawsuits for infringement of patent, and the expense of these, the burning of the cotton-gin factory which he and Phineas Miller had established in Conn., the false reports that the gin cut the cotton fibre, and the influence of southern congressmen against renewal of the patent, left the inventor without any reward except a royalty for five years from N. C., and a bonus of $50,000 from S. C., which was collected only with much expense and delay. A royalty was promised by Tenn., but afterward repudiated. In 11 years following the invention the export of cotton from the United States had increased 21 2-3 times. With little left of the gains he should have

received, Whitney began the manufacture of firearms 1798, and founded what is now Whitneyville, named from him, near New Haven. He devised his own machinery and tools, and was a pioneer in the system of division of labor in this manufacture, and in making the parts of a musket of a fixed pattern and size, so as to be replaceable. He received repeated contracts from government, which brought him a fortune and promoted the defensive independence of the nation. He died in New Haven. To Yale he left a fund for purchase of books on mechanics and physics.

WHIT'NEY, JOSIAH DWIGHT, LL.D.: geologist: b. Northampton, Mass., 1819, Nov. 23; d. Lake Sunapee, N. H., 1896, Aug. 18. He graduated at Yale 1839; studied chemistry with Dr. Hare in Philadelphia; was asst. geologist in the N. H. survey 1840-42; studied geol. and related sciences in Europe 1842-47; was at first asst. and then chief geologist in the survey of the Lake Superior district; visited other mining regions; was state chemist and prof. in the State Univ. of Iowa from 1855, and with Prof. Hall made a geol. survey of that state; and was state geologist of Cal. 1860-74. After 1865 he was prof. of geol. in Harvard, and superintendent of the school of mining. Besides his co-authorship with John W. Foster in reports on the geol. of Lake Superior, and with Prof. James Hall on that of Iowa, he published a translation of Berzelius's *Use of the Blowpipe* (1845); *The Metallic Wealth of the United States* (1854); *Geological Survey of California*, 6 vols. (1864-70); *The Yosemite Guide Book* (1869); *Barometric Hypsometry* (1874); *California Botany*, vol. I. (1877); *Contributions to American Geol.* (1880); *Names of Places, or Studies in Geographical and Topographical Nomenclature* (1888).

WHIT'NEY, MOUNT: highest mountain in the United States outside of Alaska; in the Sierra Nevada of s. Cal., in an arid and imperfectly explored region. It is 14,890 ft. high, and has been found very serviceable for meteorological and physical observations, at a height of 13,000 feet.

WHIT'NEY, WILLIAM COLLINS, LL.D.: sec. of the navy under Pres. Cleveland; b. Conway, Mass., 1841, July 15; d. New York City, 1904, Feb. 2. He graduated at Yale 1863, studied law at Harvard and in New York. He was counselor for prominent insurance companies, and corporation counsel 1875-6 and 1880-82, and did much to ward off fraudulent claims, having previously opposed the Tweed *régime*. He was an active supporter of Samuel J. Tilden. Appointed sec. of the navy 1885, in Pres. Cleveland's cabinet, he rendered most efficient and judicious service in the renewal of the navy.

WHIT'NEY, WILLIAM DWIGHT, LL.D.: philologist: b. Northampton, Mass., 1827, Feb. 9; d. New Haven, Conn., 1894, June 7; brother of Josiah Dwight Whitney. He graduated at Williams Coll. 1845, pursued linguistic studies while clerk in a bank, and, 1849-50, at Yale, also afterward, for some years, in Germany, where he issued an edition of one of the Vedic hymns. From 1854 he was prof. of Sanskrit at Yale, and from 1870 also of comparative philology, attaining great eminence in these departments, and a reputation both American and European, recognized by membership in many learned societies on both sides of the ocean, and by honorary degrees.—Besides his translations and corrected texts of the old Sanskrit writings, and many articles in reviews, transactions, and cyclopedias, he published: *On the Material and Form of Language* (1872); *Darwinism and Language* (1874); three series of *Oriental and Linguistic Studies* (1873-75); *Life and Growth of Language* (1876); *Essentials of English Grammar* (1877); *Logical Consistency in Views of Language* (1880); *Mixture of Language* (1881); *The Study of Hindoo Grammar and of Sanskrit* (1884); *Introductory French Reader* (1891); also French, German, and Sanskrit grammars. He was also contributor or co-editor of dictionaries in several languages, and was the editor-in-chief of the great *Century Dictionary*.

WHITON, *hwī'ton*, JAMES MORRIS, PH.D.: Congregational minister: b. Boston, 1833. Apr. 11. He graduated at Yale 1853; was at the head of the Hopkins Grammar School in New Haven 1854-64; pastor in Lynn, Mass., 1865-75; principal of Williston Seminary, Easthampton, Mass., 1876-78; pastor of the First Congregational church, Newark, N. J., 1879-85, and of the Congregational church in Tremont, in the annexed district of New York, 1886-91. His views on endless punishment were by many criticized as unorthodox; but he has fully maintained his place in the denominational fellowship. As writer and preacher, he has comprehensive and accurate thought, and a notably pure, lucid, and vigorous style. Besides school-books, he has published: *Is Eternal Punishment Endless?* (1876); *Essay on the Gospel according to Matthew* (1880); *The Gospel of the Resurrection* (1881); *Early Pupils of the Spirit* (1884); *The Evolution of Revelation* (1885); *The Divine Satisfaction* (1886); *Turning of Thought and Conduct* (1887); *The Law of Liberty* (1888); etc.

WHITSIDE, *hwĭt'sīd*, SAMUEL MARMADUKE: American military officer: b. Toronto, Canada, 1839, Jan. 9; d. 1904. He entered the United States army in 1858; served through the civil war, was brevetted major in 1865 and in 1866 was appointed captain. He was afterward engaged for more than 25 years in the Indian wars on the western frontier, where he captured Big Foot and his 400 Sioux warriors in Dec., 1890; and commanded

his regiment at the battle of Wounded Knee on the following day. He was promoted lieutenant-colonel in 1895; was in command of the 5th United States cavalry during the Spanish-American war, and was placed at the head of the Department of Santiago and Puerto Principe, Cuba, in Jan., 1900. He was promoted brigadier-general of volunteers in 1901, receiving that rank in the regular army in 1902, and in the same year was retired from active service.

WHITSUNDAY, n. *hwĭt'sn-dā* or *hwĭt-sŭn'dā* [supposed to be so called because the catechumens in the primitive church who received the rite of baptism on the eve of this festival were clothed in *white* robes: AS. *Hwíta Sunnan-Dæg:* AS. *hwít,* white]: the 7th Sunday after Easter—a festival in commemoration of the descent of the Holy Spirit on the day of Pentecost (q.v.), in *Scot., Whitsunday* as a term-day (regulating the letting of houses, farms, etc.) falls (with some local exceptions) on May 15. WHITSUN, a. *hwĭt'sŭn,* pert. to or observed at *Whitsuntide.* WHIT'SUNTIDE, n. *-tīd,* the season of Pentecost. The name 'Whitsuntide' comprehends the entire octave, or the week which follows Pentecost Sunday; but the word is more strictly applied to the Sunday, Monday, and Tuesday of that week. The last two days, till a very recent date, were observed in the Rom. Cath. Church as holidays of strict obligation. Many festive observances were anciently practiced in connection with the Whitsuntide holidays, which in England and other Prot. countries still subsist, having outlived the religious association out of which they originated. WHIT-MONDAY or WHITSUN-MONDAY and -TUESDAY, n. the Monday and Tuesday following Whitsunday —observed in England as holidays. The name *Whitsunday* as applied to the day of Pentecost is difficult to explain in view of the fact that in the Roman Church baptism was administered on the first Sunday after Easter (Low Sunday), which received the name of Alb Sunday (*Dominica in albis*), from the white robes worn by the candidates for baptism. The explanation offered is that inasmuch as baptism by immersion formerly prevailed, the later date of Pentecost would naturally be preferred for the rite in the colder climates of the British Islands, and the n. of Europe; hence Pentecost came to be a white (robe) Sunday as well as Low or Alb Sunday.

WHITTEMORE, *hwĭt'mōr,* THOMAS, D.D.: Universalist minister: 1800, Jan. 1—1861, Mar. 21; b. Boston. He was an apprentice in leather and brass works; studied theology with the Rev. Hosea Ballou; was pastor of Universalist churches in Milford, Mass., 1821-2, and in Cambridgeport 1821-31; was associate editor of the *Universalist Magazine,* and founder and editor of *The Trumpet* 1828-57. He became pres. of the Vt. and Mass. railroad and of a Cambridge bank; and served a num-

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ber of terms in the legislature. He died in Cambridge. His chief publications were: *Modern Hist. of Universalism* (1830, enlarged 1860); *Notes and Illustrations of the Parables* (1832); *Songs of Zion* (1836); *Commentary on the Revelation of St. John* (1838); *A Plain Guide to Universalism* (1839); *The Gospel Harmonist* (1841); *Conference Hymns* (1842); *Life of Walter Balfour* (1853); *Life of Rev. Hosea Ballou* (4 vols. 1854-5); and *Autobiography* (1859).

WHITTIER, *whĭt-ĭ-ẽr,* JOHN GREENLEAF: 1807, Dec. 17—1892, Sep. 7; b. Haverhill, Mass.: poet: he was reared in the faith, the garb, and speech of the Friends, known as Quakers; and has always maintained their peculiarities of belief and practice, though he has not confined himself to the traditional drab raiment. His first ancestor who adopted the faith was son of one of the early Puritan settlers. Whittier's father was a farmer; the son thus had experience of the country life and scenes depicted vividly in some of his poems. He also learned the winter occupation of home-shoemaking, common among farmers of the n.e. states in the first part of the 19th century. For education beyond the district school, he was indebted to the library of Dr. Elias Weld, of his native town; and, at the age of 20, to six months' tuition in the academy there. He had already, the year previous, begun to contribute verse anonymously to the *Free Press* of Newburyport, edited by William Lloyd Garrison, who encouraged the young writer. Soon he contributed to other periodicals, including the *New England Magazine,* and in his 22d year for a while edited the *American Manufacturer* in Boston, returning the next year to Haverhill to edit the *Gazette,* and, after six months, the *New England Weekly Review,* in Hartford, Conn. Two years later ill health brought him home, and 1835 he served a term in the legislature. He was sec. of the Amer. Anti-slavery Soc. 1836-7, and was editor of the *Pennsylvania Freeman* 1838-9, in Philadelphia, where he calmly faced a mob that destroyed his printing-office. Following this he settled in Amesbury, Mass., where he has since resided, spending his winters of late years in Danvers. For 12 years from 1847 he contributed editorially to the *National Era,* a paper established in Washington by Dr. Gamaliel Bailey to advocate the cause of freedom in connection with a high standard of literary merit. His anti-slavery writings, both in prose and verse, had the fire of the denunciatory Hebrew psalms, and the tone of a clarion; but he would gladly have seen a peaceful solution of the problem, and, after the war, was disposed to friendly concessions, like others of the old warriors of abolition agitation. He was never married, his sister Elizabeth, a poetess (d. 1864), having been his housekeeper for many years, and, after her death, his niece.

Whittier's poetry is natural, free, yet carefully elab-

orated. It was widely quoted for its bold and ringing 'voices of freedom,' and has had and still has a great popularity for its frequent tender sentiment, home scenes and scenery, happily embodied native legends, and devout yet liberal religious tone, with occasional quiet humor. Among the poems most familiar to readers are 'Snow-Bound,' 'Maud Muller,' 'Barbara Frietchie,' and 'Skipper Ireson's Ride.' He is a poet of America, both of its past and present. In harmony with his poetry, full of sympathy with humanity and popular in cast, he is simple and kindly, though naturally shy and undemonstrative. In person he is tall, slender, and grave. His first volume was in prose and verse, *Legends of New England* (1831). Other prose writings are: *The Stranger in Lowell* (1845); *Supernaturalism in New England* (1847); *Leaves from Margaret Smith's Journal, 1678-99* (1849); *Old Portraits and Modern Sketches* (1850); *Literary Recreations and Miscellanies* (1854); collected *Prose Works*, 2 vols. (1866); *Child Life in Prose* (1873); and revised *Prose Works* (1888-9). The first complete ed. of his poems was issued, illustrated, in the 'Red Line' series, 1868; another ed., 2 vols. 16mo. 1869; the last ed., 'New Riverside,' vols. I-IV. (*Poetical Works*) of his entire writings, 1888-9. Some of the many successive small vols. of poetry have been exquisitely illustrated by the best artists. Of his separate publications related to national issues were: *The Voices of Freedom* (1849); *In War Time, and Other Poems* (1863); and *National Lyrics* (1865). These volumes, being lyrical and inspired by the poet's most fervid feeling, are most characteristic of his genius. The first edition of his poems in England was *Ballads, and Other Poems* (1844), followed by *Poetical Works* (1850). See Underwood's *Biog.* (1875 and 83), and W. S. Kennedy's *John G. Whittier: His Life, Genius, and Writings* (1882).

WHITTINGHAM, *hwĭt'ĭng-am*, WILLIAM ROLLINSON, S.T.D.: Protestant Epis. bishop of Maryland: 1805, Dec. 2—1879, Oct. 17; b. New York. He was educated by his mother, who, for this purpose, became proficient in languages, including Hebrew, in which she instructed theological students. From the General Theol. Seminary in New York he graduated 1825; was engaged in mission work near Orange, N. J., where he became rector of St. Mark's 1829; was rector of St. Luke's, New York, 1831, and professor of ecclesiastical history in the General Theological Seminary 1835. In 1840 he was chosen bishop of Maryland, and his administration, though disturbed by his adherence to the Union cause during the civil war, was prosperous, including the establishment of educational and charitable institutions. His high church position occasioned some controversies; in 1876 he was 'presented' for permitting a rector to read prayers for the dead. He was a delegate to for-

eign conferences, including that of the Old Catholics. His literary work was editorial on papers and books, exhibiting much learning; and he was one of four contributors to *Essays and Dissertations in Biblical Literature* (1829).

WHITTINGTON, *hwĭt'ĭng-ton*, Sir RICHARD: b. probably not long before 1360; d. 1423, Mar.; son of Sir William de Whittington, of Pauntley, Gloucestershire, England. Having no fortune, he went to London to engage in trade. The well-known tradition recounts that Whittington left London on account of ill usage, but was induced to return by his interpretation of the friendly sound of Bow Bells; and that he afterward found means of living, and of great success, through the instrumentality of his cat. These stories, current since before the end of the 16th c., cannot be said to have any authentic foundation; yet there is nothing improbable in them. He appears, however, to have apprenticed himself to a mercer, and to have rapidly risen in the world. In 1392 he was a member of the Mercer's Company, and was elected alderman and sheriff of London. In 1397, 1398, 1406, 1419, he was lord mayor of London; and was elected to parliament 1416. For services to Henry V., he received knighthood. There is no doubt of his diligence and uprightness in business; and his great prosperity was equalled by his liberality.—For an argument in favor of the traditions above noted, see the Rev. Samuel Lysons's *Model Merchant of the Middle Ages* (Lond. 1860): see also Besant and Rice's *Sir Richard Whittington* (Lond. 1881).

WHITTLE, n. *hwĭt'tl* [AS. *thwítan*, to cut]: in *Scot.* and *prov. Eng.*, a small pocket-knife: V. to cut, pare, or dress with a whittle or pocket-knife; to form, prepare, or reduce by paring; to shape with a pocket-knife. WHITTLING, imp. *hwĭt'tlĭng*. WHITTLED, pp. *hwĭt'tld*.

WHITTLE, n. *hwĭt'tl* [AS. *hwitel;* Icel. *hvitill*, a blanket—from AS. *hwít;* Icel. *kvitr*, white: comp. *blanket* from F. *blanc*, white]: in *OE.* and *prov. Eng.*, a blanket worn over the shoulders.

WHITTLESEY, *hwĭt'l-sĭ*, CHARLES: American geologist: b. Southington, Conn., 1808, Oct. 4.; d. Cleveland, Ohio, 1886. He was graduated from West Point in 1831, served in the Black Hawk war of 1832 and resigned from the army in that year. He was admitted to the bar and engaged in law practice at Cleveland, where he was on the editorial staff of the *Herald* in 1836-7, and in 1837-8 was engaged in the Ohio State geological survey. He was occupied in making a mineralogical and geological survey of the Lake Superior and upper Mississippi regions for the United States government in 1847-51, and in 1858-60 was attached to the Wisconsin geological survey. In 1861, Apr. 17, he was appointed assistant quartermaster-general on the staff of the gov-

ernor of Ohio, and in the western Virginia campaign served as chief engineer of the Ohio troops. He was appointed colonel in August, 1861, and was subsequently chief engineer of the Dept. of the Ohio. He led his regt. at the battle of Fort Donelson and at the battle of Shiloh was in command of a division. Failing health compelled his resignation in 1862 and he resumed his surveys in the Lake Superior and upper Missisippi regions. He was one of the founders in 1867 of the Western Reserve Historical Society of Cleveland, and was for many years its president. His writings include more than 200 titles. Among them are: *Description of Ancient Works in Ohio* (1851); *Ancient Mining on the Shores of Lake Superior* (1863); *Early History of Cleveland and Vicinity* (1867); etc.

WHITTREDGE, *hwĭt'rij*, WORTHINGTON: artist: b. Springfield, O., 1820, May 22. About 1840 he went to Cincinnati, and began portrait and landscape painting. In 1845 he visited London and Paris, and for three years studied under Andreas Achenbach, at Düsseldorf. He studied also in Holland and Belgium. He was in Rome 1855-59; then returned to the United States, and opened a studio in New York. In 1860 he was elected an assoc. of the National Acad., a full member 1861, and its pres. 1874. Among his paintings, which are principally of American scenery, are: *Twilight on the Shawangunk; The Coast of Rhode Island; The Ruins of Tusculum; The Rocky Mountains from the River Platte;* and *Plains of Colorado.*

WHITWORTH, *hwĭt'wėrth*, Sir JOSEPH, F.R.S., LL.D., D.C.L.: mechanician: 1803, Dec. 21—1887, Jan. 22; b. Stockport, England. In 1833 he engaged in the manufacture of engineers' tools in Manchester, and introduced a uniform system of screw-threads and standard gauges for engineering work. His exhibit of improved planing machines and other tools attracted attention at the London exhibition 1851. He was commissioner to the New York exhibition 1853. In 1854 he began the manufacture of firearms, developed the Whitworth rifle, made other improvements in guns, and became a competitor of Sir William G. Armstrong (q.v.) in the manufacture of rifled ordnance. In 1868 he established 30 scholarships, of £100 annual value each, to encourage engineering science. He was made a baronet 1869. He published: *Miscellaneous Papers on Mechanical Subjects: Guns and Steel* (1873); and *Plane Metallic Surfaces, and Preparing Them* (1879).

WHITY-BROWN, a. *hwī'tĭ-brown* [*white*, and *brown*]: of a color between white and brown.

WHIZ, v. *hwĭz* [imitative of the sound it is intended to represent, as *fizz* or *hiss* (see also WHEEZE)]: to make a sharp hissing or humming sound, as an arrow or rifle-ball during flight, or as compressed air escaping; to fizz:

N. a hissing sound. WHIZ'ZING, imp. WHIZZED, pp. *hwizd.* WHIZ'ZINGLY, ad. *-lĭ.*

WHO, rel. *hô* [AS. *hwá;* Dan. *hvo;* Dut. *wie;* Ger. *wer;* Russ. *kto;* L. *quis;* W. *pwy;* Skr. *kas,* who]: a relative or interrogative word which refers to a person; which of many or of all these, as, *who* is the person who has a right to exercise it? used interrogatively. WHOM, *hôm,* obj. case of who. WHOSE, *hôz,* poss. case of who; used also instead of 'of which' (referring to things), as, the question *whose* solution is desired. WHOEV'ER, rel. *-ĕv'ĕr,* every one who; whatever person. WHOSO, rel. *hô'so,* or WHO'SOEV'ER, rel. every one who—WHOM'SOEV'ER being the obj. case, and WHOSE'SOEV'ER the poss. case.

WHOA, int. *hwō:* stop!

WHOLE, a. *hōl* [Dut. and Dan. *heel;* Icel. *heill;* Sw. *hel;* Ger. *heil;* Goth. *hails,* entire: W. *holl,* all; *hollol,* whole: a doublet of HALE 1]: all; entire; unbroken; sound; containing the total amount; not defective; in *OE.,* in good health; hale: N. the total: the entire thing; a regular or systematic combination. WHOLE'NESS, n. *-nĕs,* entireness; totality. WHOLLY, ad. *-lĭ,* entirely; completely; in all the parts or kinds. WHOLE'SALE, n. *-sāl* [*whole,* and *sale*]: the sale of goods in large quantity to retailers only; the whole mass: ADJ. buying and selling in large quantity only; of or pertaining to such sale; extensive and indiscriminate as *Wholesale* accusations. WHOLESALERS, n. plu. *-ĕrz,* those who sell by wholesale. By WHOLESALE, in the mass; without distinction or discrimination. WHOLESOME, a. *-sŭm* [*whole,* and *some*]: favoring health; salubrious; useful; conducive to happiness or virtue; salutary; in *OE.,* hale; healthy. WHOLESOMELY, ad. *-lĭ.* WHOLESOMENESS, n. *-nĕs,* the state or quality of being wholesome or conducive to health. WHOLE-LENGTH, n. a portrait or statue representing the whole person or thing: ADJ. representing the whole figure, said of a picture or statue.—SYN. of 'whole, a.'; all; every; each; complete; total; integral; perfect; undivided; uninjured; unimpaired; healthy;—of 'whole, n.'; gross; amount; totality; aggregate.

WHOM, WHOMSOEV'ER: see under WHO.

WHOO'BUB, or WHO'BUB, n. *hô'bŭb:* OE. for HUBBUB (q.v.).

WHOOP, v. *hôp* [imitative of a clear high-pitched cry as is heard in the hooping-cough: F. *houper,* to call afar off]: to utter loud, shrill, and prolonged sounds in pursuit or attack, as in war by savages; to insult with shouts or defiance: N. a shout in pursuit or attack in war or the chase. WHOOP'ING, imp. WHOOPED, pp. *hôpt.* WAR-WHOOP, a batle-cry; the shout of attack.

WHOOPING COUGH, or PERTUSSIS: a paroxysmal cough, consisting of a series of short, spasmodic, forcible expirations, followed by a deep, prolonged inspira-

tion, attended by a peculiar sonorous sound, called the 'whoop.' The paroxysms terminate by expectoration or vomiting of thick, glairy mucus. It is infectious, often epidemic, and occurs chiefly in infancy and childhood. Infants under three years of age are especially liable to it; it is rare after 10 years of age, though adults are not entirely exempt; the latter often have a sympathetic cough from nursing children who have the disease. The younger the infant the more dangerous is the disease, especially when it occurs at the time of dentition. The duration of the disorder varies from two to three weeks, or many months, depending very much on the time of year at which the disease is contracted, and on the temperament and constitution of the child. One attack generally insures immunity for the rest of life. As an infectious disease it is most dangerous to the unaffected when at the height of its development; but a frequent source of infection is when a child has recovered from the disease, and thought to be safe from further attacks, but takes it again in a mild form, and then transmits it to those in whom it may be developed in the worst form. It is therefore by no means safe to admit into schools and families any child who comes from a house where the cough still lingers.

The earliest means of recognition is a persistent cough. When the whoop is heard, all doubt is removed. It should be distinguished from spasmodic croup by the 'whoop' preceding the cough, whereas in whooping cough the whoop follows the cough. The disease is generally preceded by a common cold, cough and feverishness. After from 7 to 10 days of the catarrhal stage the cough becomes louder, more prolonged, and assumes the characteristic convulsive character. A sensation of tickling in the larynx indicates the advent of cough, and warns the child to lay hold of something for support during the paroxysm. Each paroxysm consists of a number of sudden, violent, and short expiratory efforts or coughs, which expel so large an amount of air from the lungs that the patient appears on the point of suffocation. These efforts are followed by a deep-drawn inspiration, in which the rush of air through the partially closed glottis gives rise to a distinctive crowing or 'whooping' noise. This whooping is the signal of the patient's safety, for when suffocation takes place it is before the crowing inspiration has been made. During the paroxysms the face becomes deeply red or purple, and swells. The eyes protrude and are suffused with tears, and the expression and appearance of the sufferer are such as apparently to indicate imminent suffocation. The paroxysm terminates by vomiting or an expectoration of a considerable amount of ropy mucus, almost immediately after which the child returns to his amusements and appears quite well. The ropy kind of expectoration which follows the cough enables us to distin-

guish it from common cough, even before the whoop has been heard. The attacks recur three or four times a day, or every three or four hours, or oftener. Sometimes blood escapes from the nose, mouth, and even from the ears during the fits. The cough is generally worse at night, so that the decline of nocturnal attacks is a favorable sign. Severe relapse may ensue from exposure to cold, improper food, and want of careful nursing during convalescence. Weakness and loss of flesh are occasioned by a repeated vomiting of food from the stomach, and by the terror with which the child dreads the attacks. It is rarely fatal except in teething children, though the danger is greater during the colder season of the year. Whooping cough often follows measles, and may be complicated with that disease, also bronchitis may be caused by an extension of the inflammatory process from the larynx downward. It is very desirable that the patient should be carefully examined in obstinate cases to see if any of these complications are setting in. Pneumonia and tuberculosis may be occasionally complicated with whooping cough. Convulsions are liable to occur if the disease attacks teething children.

WHOP, p. *hwŏp* [of imitative origin]: *familiarly,* to beat; to thrash. N. a blow or fall. WHOP'PING, imp. WHOPPED, pp. *hwŏpt.* WHOP'PER, n. *-pėr,* one who whops; *familiarly,* a tremendous falsehood.

WHORE, n. *hōr* [Icel. *hóra;* Ger. *hure;* Dan. *hore;* Dut. *hoer,* a whore: comp. Skr. *charu,* agreeable: L. *carus,* dear]: a woman who admits unlawful intercourse of men for money; a prostitute; a harlot; V. to practice prostitution; to corrupt by unlawful intercourse with. WHORE'DOM, n. *-dŏm,* practice of unlawful intercourse with the opposite sex for hire; fornication; in *Scrip.,* the desertion of the worship of the true God for that of idols; idolatry. WHORE'MONGER, n. *-mŭng-gėr,* or WHORE'MASTER, n. a lewd man; one who keeps or frequents the society of whores. WHORISH, a. *hō'rĭsh,* lewd; unchaste. WHO'RISHLY, ad. *-lĭ.* WHO'RISHNESS, n. *-nĕs,* the practice of lewdness. WHO'RING, n. the practice of lewdness; in *Scrip.,* the worshipping of idols. WHORESON, n. *hōr'sŭn,* in *OE.,* a bastard: ADJ. in *OE.,* bastard; contemptible. *Note.*—WHORE may be derived from *hire,* as L. *merĕtrix,* a whore, is from *merĕor,* I earn money.

WHORL, n. *hwėrl* or *hwawrl* [O. Dut. *worvel,* a spinning-whirl: connected with WHIRL (which see)]: any set of organs or appendages arranged in a circle round an axis, and in, or very nearly in, a plane perpendicular to it; a turn of the spire of a univalve shell; leaves arranged in a regular circumference round a stem; the fly of a spindle. WHORLED, a. *hwėrld,* disposed in or furnished with whorls. WHORL'ER, n. *-ėr,* a potter's wooden wheel which gives a rotatory motion to flat vessels.

WHORL-GRASS, a water-plant, the *Catabrōsa aquatĭca*, ord. *Graminĕæ*.

WHORT, n. *hwėrt*, or WHORTLE, n. *hwėr'tl* [according to Skeat, from AS. *wyrtil*, a small shrub, dim. of *wyrt*, a wort (see WORT 2)]: a shrub and its fruit; the whortleberry.

WHORTLEBERRY, *hwėr'tl-bĕr'rĭ* (popularly, HUCKLEBERRY): small shrub (or its fruit) of the genera *Vaccinium* and *Gaylussacia*, and nat. order *Ericaceæ*, having a 4-5-toothed calyx, a 4-5 cleft bell-shaped or urceolate corolla, with the limb bent back, 8 or 10 stamens, with two-horned anthers, and a 44-5-celled many-seeded berry; the latter genus 8-10-celled, a single ovule in each cell. In the United States the name is most often applied to the blackberried G. *resinosa*, but for this and other species the names Huckleberry or Blueberry are used most frequently. The species are numerous, natives mostly of northern parts of the world, with evergreen or deciduous, more or less ovate leaves.—The COMMON WHORTLEBERRY, or BILBERRY (*V. myrtillus*), called in Scotland the *Blaeberry*, is very common in Gt. Britain and in middle and n. Europe. It is found also in Iceland and in the n. regions of N. America. It varies from a few inches to almost 2 ft. in height, and has ovate deciduous leaves and dark-purple berries: a variety occurs, but rarely, with white berries. The berries are very sweet and agreeable, and are much used for making jelly. A kind of spirituous liquor also is made from them in Germany.—The BOG WHORTLEBERRY, or GREAT BILBERRY, or BOG BILBERRY (*V. uliginosum*), is common in n. Europe and Asia, and on the highest hills on both sides of the Canadian border. It is said to cover extensive tracts in Greenland. It grows in marshy situations, and is a taller plant than the Common Whortleberry. It has deciduous, obovate, entire leaves, and a fruit larger than the Common Whortleberry, and inferior to it in flavor. The fruit is said to cause giddiness when eaten in large quantity. An intoxicating liquor is made from it in Sweden and in Siberia. The only other Brit. species is the RED WHORTLEBERRY (*V. vitis Idæa*), often called *Cranberry*, because of the similarity of its acid fruit to the Cranberry (q.v.). It is a native of n. Europe, Asia, and America, and in the United States is called Cowberry; it is found in n. New England and British America. Its fruit is esteemed for preserves, and is used in the same way as the cranberry. Large quantities are sent to s. Europe from the shores of the Gulf of Bothnia. The plant is a pretty dwarf shrub, with obovate evergreen leaves and racemes of flowers.—Many species of *Vaccinium* are in occasional cultivation as ornamental shrubs, and the fruit of most of them is agreeable, though in general it lacks acidity. Their more general cultivation has perhaps been prevented by the prevalent notion that they require a peat soil, but they

succeed on other soils also. Most of them are North American.—The BLACK WHORTLEBERRY, or HUCKLEBERRY (*Gaylussacia resinosa*), is a shrub about 2 ft. high, much branched and erect, with deciduous oval leaves. The berries are of shining black color, and sweet. It is widely diffused from Canada to Georgia. The BLUE TANGLEBERRY or DANGLEBERRY (*Gaylussacia frondosa*) is a rather larger and more spreading shrub, which grows in thickets from New England to Kentucky. The fruit is sweet and edible.—The BEAN WHORTLEBERRY (*V. ursinum*, or *Gaylussacia ursina*) is found on the mountains of North Carolina, the BOX-LEAVED WHORTLEBERRY (*Gaylussacia brachycera*) in Pennsylvania and Virginia. Other species are the Dwarf Huckleberry (*G. dumosa*), in low sandy soil, from Maine s. on the coast; the Dwarf Blueberry (*V. Pennsylvanicum*), Pennsylvania and Illinois and n., the earliest in the market; the Canada Blueberry (*V. Canadense*), Maine to Wisconsin and n., in damp situations; the Low Blueberry (*V. vacillans*), New England to Virginia and n. Illinois, pale-leaved, branches yellowish green; and the Common or Swamp Blueberry (*V. corymbosum*), the common blue huckleberry of the latter part of the season. The genus V. includes other North American species, among which are the Deerberry or Squaw Huckleberry, and the cranberries.—Several species are natives of Mexico. *V. arctostaphylos* is a native of the coast of the Black Sea; and *V. padifolium* is a native of Mt. Caucasus and of Madeira, on the loftiest parts of which island it forms impenetrable thickets, growing 6 to 10 ft. high.

WHOSE, rel. *hôz* [see WHO]: the poss. case of the rel. *Who* (q.v.), used also for 'of which.' WHOSE'SOEV'ER, rel. of whatever person.

WHOSOEVER, rel. *hô'sō-ĕv'ėr* [see WHO]: whoever; whatever person.

WHY, ad. and int. *hwī* [AS. *hwí*, the instrumental case of *hua*, who]: for which or for what reason or cause; wherefore; used emphatically, as, 'if you will not, *why* then I'll go;' used as a substantive, meaning the 'reason,' as, 'we examine the *why* of things.'

WHYDAH, *hwĭd'â*, or WHYD'AW, or WHID'AW: maritime province of Dahomey (q.v.), in Africa; on the Bight of Benin. It is populous and very fertile, and exports palm-oil, gold-dust, ivory, and many slaves.—The town of Whydah is the principal seaport of Dahomey, a decaying place since the suppression of the slave-trade; about 65 m. s.e. of Abomey, the capital of Dahomey, and about 1½ m. from the sea, close to a lagoon and a swamp, between which and the sea a sandy neck intervenes. Into the lagoon flow several rivers, known to slave-traders. For about two-thirds of the way from Whydah to Abomey, the road lies through dense forest and across a swamp 8 m. wide.—Pop. about 20,000.

WHYD'AH-BIRD, or WHYD'AH-FINCH, or WID'OW-BIRD: one of the Weaver-birds (q.v.), of the genus *Vidua,* having long wings and a boat-shaped tail, the two middle feathers of the tail of the males excessively lengthened during the breeding season. The name is derived from the country of Whydah in w. Africa, and 'widow-bird' is a mere corruption of it, which, however, has given to the genus its name *Vidua* [L., widow], regarded as appropriate, because the long tail of the male drops off after the breeding season, also because of the general dark color of the plumage. The species are natives of tropical parts of Africa and s.e. Asia. They are frequently brought to Great Britain as cage-birds, for their plumage and the sweetness of their song. The best-known species (*V. paradisea*) is a small bird, about the size of a canary, with black and brownish black plumage, with a broad collar of orange-rufous color, and breast of somewhat similar color; two feathers of the tail in the male very broadly webbed in the breeding season, and ending in a hair-like shaft, two feathers very much elongated, sometimes 12 in. in length, and about three-quarters of an inch in breadth.

WHYMPER, *hwĭm'pėr,* EDWARD: traveller, author, and artist: b. London, 1840, Apr. 27. He was educated at Clarendon House School, and took up the profession of draughting on wood, but turned to a more active life. In 1861 he climbed Mont Pelroux, then considered the highest peak in France, and 1861-65 made a series of adventurous ascents among the Alps, being the first to climb the Matterhorn (1865, July 14), when four of his companions lost their lives. He traveled in Greenland 1867 and 1872, making valuable collections of fossils. On a visit to Ecuador 1879-80 he explored many peaks of the Andes, and gathered a large zoological collection. He was the first to reach the summit of Mt. Chimborazo. He has published: *Swiss Pictures, drawn with Pen and Pencil* (1866); *English Sacred Poetry of the Olden Time; Scrambles Amongst the Alps in the Years 1860-69* (1869); and *Travels Amongst the Great Andes of the Equator* (1892); etc.

WHYTE-MELVILLE, GEORGE JOHN: British novelist: b. Fifeshire, Scotland, 1821, June 19; d. Vale of Aylesbury, Berkshire, 1878, Dec. 5. He was educated at Eton and at 18 joined the 93d Highlanders, from which he exchanged in 1846 into the Coldstream Guards. He retired in 1849 with the rank of major, but volunteered for active service in the Crimean war and was appointed major of the Turkish irregular cavalry. The rest of his life was chiefly devoted to fox-hunting and other field sports, and to the writing of novels of fashionable and sporting life. He was killed by the fall of his horse while hunting. The following are among his novels: *Kate Coventry* (1856); *Holmby House* (1860); *The*

Queen's Maries (1862); *Bones and I* (1868); *Contraband* (1870); *Sarchedon* (1871); *Satanella* (1873); *Kosine* (1875); *Roy's Wife* (1878); *Black but Comely* (1879). He also published volumes of verse.

WIARD, Norman: American inventor: b. Normandale, Ont., 1826; d. Reading, Pa., 1896, Sep. 11. In early life he was foreman in a foundry at Bradford, Ont., where he began experiments in founding ordnance. During the Civil War he was employed by the United States government in the manufacture of ordnance and projectiles, and was frequently called into consultation by the President and Secretary Stanton. After the war he applied himself to experiments and inventions in his special lines; patented a device for preventing the explosion of steam-boilers, which he sold to the United States and Japanese governments; spent two years in Japan in government employ; was for some time a military engineer in that country; and on his return to the United States conducted, near Boston, a series of experiments in gunnery which attracted wide attention.

WIBORG, or Viborg, Russia: (1) A town in Finland, capital of the government of its own name, on a bay in the Gulf of Finland, 72 m. n.w. of Saint Petersburg, with which and with Helsingfors it is connected by railway. It is regularly built in spacious streets; and has the ruins of a fine old castle, situated on an isolated rock in an arm of the sea. It carries on some iron-founding and other industries, and has a considerable trade in timber, deals, tar, tallow, and fish. The canal that connects the Gulf of Finland with Lake Saima starts at Wiborg. Pop. (1900) 32,312. (2) The government forming the s.e. region of Finland; has an area of 13,530 sq. m. Pop. 400,000.

WICAS'SET, Maine: town, port of entry, county-seat of Lincoln co.; on the Sheepscot river, and on the Maine Central railroad; about 48 m. n.e. of Portland and 20 m. from the Atlantic. In 1760 the town was incorporated under the name of Pownalboro, and in 1802 it was reincorporated under the present name. Wicasset is a popular summer resort. It is in an agricultural region and has some manufacturing interests. It has two banks. Pop. (1900) 1,273; (1910) 1,287.

WICHERN, Johann Heinrich: German philanthropist: b. Hamburg, 1808, Apr. 21; d. there 1881, Apr. 7. He studied theology at Göttingen and Berlin, and then returning to his native town gave himself up to endeavors to improve the condition of the poor and suffering. In the Rauhes Haus (founded 1833, Nov. 1) he established an institution for neglected children, with a training seminary for teachers connected with it, and similar institutions were shortly afterward formed throughout Germany. In 1856 he was appointed councillor of the Prussian ministry of the interior, and in

1858 superintendent of all penal and reformatory institutions in the kingdom. His writings include: *Die Innere Mission der Deutschen Evangelischen Kirche* (1849) *Die Behandlung der Verbrecher und Entlassenen Sträflinge* (1853); *Der Dienst der Frauen in der Kirche* (1858).

WICHITA, Kansas: city, county-seat of Sedgwick co.; on the Arkansas river, and on the Missouri P., the Atchison, T. & S. F., the Wichita & C., the Wichita & W., the Chicago, R. I. & P., and the St. Louis & San Francisco railroads; about 230 m. s.w. of Kansas City. It is in a fertile agricultural region, and is the commercial and industrial centre of s. Kansas. The chief products of this section are wheat, corn, hogs, and cattle. The city is on a long rolling prairie; it has broad, well-shaded streets, and a good system of water-works and sewerage. In 1900 (Government census) the city had 328 manufacturing establishments, capitalized for $2,108,524, and employing 1,649 persons, to whom were paid annually in salaries and wages $750,206. The raw material used each year cost $3,060,661, and the value of the finished products was $4,724,068. The chief manufactories were 7 confectionery, whose products brought annually $171,613; 10 flour and grist mills, annual products $457,275; 11 saddlery and harness works, products $168,565; and 18 men's clothing establishments, products $102,452.

The government is administered under a charter of 1886, which provides for a mayor, who holds office two years, and a city council of 12 members from six wards. The board of education is chosen by popular vote.

Wichita was settled in 1869 by Indian traders. In 1870 it was incorporated, and in 1872 was chartered as a city of the second class. Pop. (1910) 52,450.

WICHITA FALLS, Texas: county-seat of Wichita co.; on the Wichita river, and on the Wichita Valley railroad; about 115 m. n.w. of Fort Worth. It is in an agricultural and stock-raising region. It has two national banks with a combined capital of $150,000. Pop. (1900) 2,480; (1910) 8,200.

WICK, n. *wĭk* [Icel. *vik,* a corner]: a corner, as the *wicks* of the mouth.

WICK, n. *wĭk* [O. Dut. *wiecke;* Dan. *væge,* a wick: Low Ger. *weke,* lint]: soft threads of cotton or other substance loosely twisted or plaited into a string, or woven into a narrow web, for a candle or lamp. WICK'-ING, n. *-ĭng,* material for making wicks.—*Wick,* from its porous nature, draws up the oil by capillary attraction in such quantities as to burn easily. Usually wicks are of cotton; formerly flax, hemp, and rushes were used. For ordinary candles the wick consists of a bundle of cotton threads, parallel with one another; but for wax, spermaceti, paraffin, stearin, etc., wicks are usually of

twisted or plaited cotton. Very ingenious contrivances have been applied to the manufacture of candle-wicks, to prevent the necessity of snuffing: see CANDLE.

WICK, *wĭk,* or WICH, *wĭch* [AS. *wic*—from L. *vīcus,* a village; in some places the *-wick* or *-wich* is the same as Icel. *vik,* a creek or bay: it is sometimes impossible to identify the termination]: a town; a village: the second element of many place names, as Wool*wich,* Green*wich,* Ber*wick,* or as one word in *Wick* (a town in the n. of Scotland): also the district in charge of an officer, as baili*wick,* the jurisdiction of a bailie.

WICKED, a. *wĭk'ĕd* [OE. *wikke,* evil—from AS. *wicca,* a wizzard (see also WITCH)]: addicted to vice; immoral; sinful; evil in principle or practice; bad or baneful in effect; addicted to mischief; mischievous. THE WICKED, n. plu. persons who live in violation of the divine laws. WICK'EDLY, ad. *-lĭ.* WICK'EDNESS, n. *-nĕs,* corrupt or sinful manners; crime; moral ill; sin.—SYN. of 'wicked'; bad; evil; naughty; corrupt; vicious; iniquitous; criminal; guilty; unjust; unrighteous; unholy; irreligious; ungodly; profane; atrocious; nefarious; pernicious; abandoned; flagitious; flagrant; profligate, heinous; base; villainous; impious; cursed; baneful.

WICKER, a. *wĭk'ėr* [from root of WEAK: Dan. *vögger,* a pliant rod—from *veg,* pliant; Sw. *wika,* to fold; *weck,* a fold]: made of twigs or osiers; covered with twigs or osiers: N. a small, quick-grown, pliable twig; anything made of twigs or osiers. WICK'ER-WORK, work composed of osiers or wicker; basket-work. WICK'ERED, a. *-ėrd,* made of or covered with twigs.

WICKET, n. *wĭk'ĕt* [Wall. *wichet;* Norm. *viquet;* F. *guichet,* a little door within a gate: all from Icel. *vikja,* to give way]: a small gate or door; part of a massive or large door for the admission of persons on foot only; the three stumps or rods stuck in the ground, and supporting the bails, against which the ball is directed in the game of cricket. WICK'ET-KEEPER, in *cricket,* the keeper or watcher behind the wicket, in front of which the batsman is playing.

WICKING, n. *wĭk'ĭng:* in *curling,* an ingenious master-stroke by which a stone is sent in an oblique direction so as to hit the winner's stone and drive it from the *tee,* the former often replacing the latter, and so becoming the winner in turn; also called INRINGING.

WICKLIFFITE, or WICLIFFITE, n. *wĭk'lĭf-īt:* follower of Wickliffe, the Reformer: see WYCLIFFE, JOHN DE.

WICKLOW, *wĭk'lō:* maritime county of Ireland, prov. of Leinster; bounded n. by the co. of Dublin, e. by the Irish Channel, s. by the co. of Wexford, w. and s.w. by the cos. of Carlow and Kildare; greatest length 40 m., greatest breadth 33 m.; 781 sq. m., or 500,178 acres. The coast-line stretches s. about 39 m.; is in many parts

precipitous; and, being obstructed by sand-banks is very dangerous for shipping. The surface ascends in some parts abruptly from the sea, and a large portion is mountainous and unproductive. The Wicklow Mts. form rather a group than a range, and on the w. and n.w. side decline less precipitously toward the central plain. The most elevated point is Lugnaquilla, 3,039 ft. above sea-level. Several other peaks approach this elevation, and the glens between the several mountains or groups are exceedingly picturesque, especially Glendalough, Glendalure, Imail, the Glen of the Downs, and Avoca, the scene of More's well-known Irish melody, *The Meeting of the Waters.* Plains of considerable size lie on the e. and s. shore. The lakes, though strikingly beautiful, are few and of small size; and the rivers in W. are little more than mountain streams. The great central group of mountains is a mass of granite, which protrudes through mica and clay slate, to which latter formation the minor elevations generally belong. The granite protrusion, one of the most remarkable and best defined in the kingdom, falls away on the e. toward the sea, and on the w. toward the great central limestone. The minerals are numerous and varied. In the granite and mica-slate are galena, green and white lead ore, and copper pyrites. From the clay-slate tract are obtained gold (in minute quantity), silver, copper, iron, lead, zinc, tin, tungsten, manganese, arsenic, and antimony. Silver is found in combination with lead, which is raised with great success and profit. The copper mines also are very productive; and of late years the utilization of the sulphur, formerly wasted, has added largely to the profit.

The soil is very various. There are numerous villas, with extensive and highly cultivated parks, especially in the picturesque district between Bray and Wicklow. The county is divided into eight baronies and contains 59 parishes. The principal towns are Wicklow (q. v.) and Arklow.—Wicklow is described by Ptolemy as the territory of the Cauci, and the names of the rivers mentioned by him are still traceable in their modern appellations. At the English invasion (1169), the greater part of the lands of Wicklow were granted to Maurice Fitzgerald, and Wicklow was included by John in the shire of Dublin. Generally speaking, however, the authority of the English in Wicklow was little more than nominal, the territory being under the chief of the O'Byrne. During the rebellion of 1798, Wicklow was the scene of more than one conflict. Wicklow abounds with antiquities of great interest: many tumuli, raths, cromlechs, and other Celtic remains are preserved; and there are many ecclesiastical remains of almost every period of Irish Christian architecture; those of Glendalough, which include a round tower, are especially interesting.—Pop. (1901) 60,827.

WIC'LIF (or WICK'LIFFE), JOHN. See WYCLIFFE, JOHN DE.

WICOPY, *wĭk'ō-pĭ:* the Leatherwood (q.v.)

WIDDIN, or VIDIN, *vĭd'ĭn:* town of Bulgaria; on the right bank of the Danube; 140 m. from Belgrade. For centuries Widdin has been a strong post in all the contests between the Turks and their n. neighbors; and it was called by the Turks the Virgin Fort, from its never having been taken. Widdin has thriving industries and trade. The Berlin Congress of 1878, which erected Bulgaria into a principality, determined that the extensive fortifications of Widdin and other Bulgarian fortresses should be demolished. During the Servo-Bulgarian war 1886-7, Widdin successfully resisted the assaults of the Servians.—Pop. 15,000.

WIDE, a *wīd* [AS. *wíd;* Dut. *wijd;* Dan. *vid;* Ger. *weit;* Icel. *widr,* broad, ample]: having a relatively great distance or extent between the sides; opposite of *narrow;* broad; large; broad to a certain degree, as 16 ft. wide; remote; distant; extensive; AD. at a distance; in *compound words,* far; with great extent, as, 'the gates *wide* open stood:' N. in *cricket,* a ball flying *widc* or at a distance from the wicket. WIDELY, ad. *-lĭ,* in a wide manner or degree. WIDENESS, n. *-nĕs,* quality of being wide. WIDEN, v. *wīd'n,* to extend between the sides; to enlarge. WIDENING, imp. *wīd'nĭng.* WIDENED, pp. *wīd'nd.* WIDTH, n. *wĭdth,* breadth; extent from side to side. WIDE-AWAKE', n. a low-crowned felt hat: ADJ. thoroughly alive or on the watch; alert; keen. WIDE GAUGE: see BROAD GAUGE (under BROAD).

WIDE AWAKES: in American political history, a name adopted by numerous Republican campaign clubs organized for the purpose of aiding in the election of Abraham Lincoln during the presidential campaign of 1860. The first club was organized in Hartford, Conn. It is stated that in New York city there were on one occasion 20,000 Wide Awakes marching in procession.

WIDGEON, or WIGEON: a river-duck of the genus *Mareca.* Widgeons have a short bill, much rounded at the tip, with a strong, broad nail, and the upper lamellæ prominent; wings long and pointed; tail moderate and wedge-shaped. There are about 10 species in various parts of the world. They are found on the seashore and on the margins of lakes and rivers, feeding chiefly on vegetable substances, and performing periodical migrations at night in vast flocks. The American widgeon or bald-pate (*M. americana*) is about 20 in. long and 35 in alar extent; the bill is blue, black at the base and tip; upper parts finely waved transversely with dark lines; lower parts mostly white; top of head nearly white, with a broad green patch around and behind the eyes; rest of head and neck grayish, spotted and banded with black; wing-coverts white, the greater tipped with

black; speculum green, encircled by black. The baldpate is found throughout North America, breeding chiefly n. of the United States and wintering in Central America. It is an active bird, with a swift and well sustained flight, in ranks of various and irregular forms; and it associates during the winter with teals and other ducks. The flesh is highly esteemed, especially when they have fed in the rice fields of the south, or along with the canvas-back on the water-celery of the Chesapeake. They do not dive, but feed with the head and neck immersed, swimming very near together. The food consists of aquatic seeds, roots, insects, worms, small fry, leeches, nuts, and grain, especially rice in the rainy season; being very fond of the tender aquatic plants on which the canvas-back feeds, and no diver itself, it watches the latter and snatches the morsels as it emerges and before it has had time to open its eyes. They are among the most difficult ducks to shoot, owing to their shyness and swift, irregular flight. The nest is built on the ground, often far from water, and usually of leaves lined with down. The eggs number 8 or 10, are pure ivory white, and about 2 in. long by nearly 1½ in diameter. The European widgeon (*M. penelope*) is rather smaller, and not uncommon all along the Atlantic coast of the United States, as well as on the Pacific. It differs chiefly in having the head and neck reddish brown or cinnamon, the top of the head cream-colored.

WID'NES, England: a manufacturing town in Lancashire, on the Mersey, opposite Runcorn, 13 m. e.s.e. of Liverpool by rail. There are extensive chemical, alkali, and soda works; soap, candle, grease, and manure works; copper-smelting works and rolling-mills, and iron-foundries. The town has a considerable carrying trade, which has been further developed by the construction of large docks in 1866, extended in 1884. Pop. (1901) 28,580.

WIDOW, n. *wĭd'ō* [AS. *wuduwe;* Goth. *viduvo;* Ger. *wittwe;* L. *vidua,* a widow; Skr. *vidhava,* a widow]: a woman whose husband is dead: V. to deprive of a husband; to deprive of anything highly valued; in *OE.,* to endow anew with widow's rights that had been forfeited; to be widow of; survive as the widow of. WID'OWING, imp. WID'OWED, pp. *-ōd:* ADJ. bereaved of a husband by death; deprived of some good; stripped. WID'OWER, n. *-ėr,* a man deprived of his wife by death. WID'OWHOOD, n. *-hûd,* state of being a widow; in *OE.,* a widow's property or estate. WID'OWERHOOD, n. state of being a widower. GRASS-WIDOW (see GRASS).—A *Widow's* rights to dower extend, by the common law of England, to a life-estate in one-third of the lands and tenements of which her husband died seized, and which any issue that she may have had might by possibility have inherited, and the law of dower in the United States generally conforms substantially to this. There are certain modes of

conveying and devising property so as to prevent dower arising; also a widow's right to dower is generally prevented by giving her a jointure. A woman loses her dower by a divorce, but not by judicial separation or by misconduct: see DOWER, JOINTURE, JUS RELICTÆ, MARRIAGE.

WID'OW-BIRD. See WHYDAH-BIRD.

WIDTH. See WIDE.

WIELAND, *wē'land*, Ger. *vē'lânt*, CHRISTOPH MARTIN: German poet and man of letters: 1733, Sep. 5—1813, Jan. 20; b. at Oberholzheim, near Biberach—his father being pastor of that place and afterward in Biberach. In 1750 Wieland went to the Univ. of Tübingen to study law, but occupied himself more with the classics and with recent literature native and foreign. He returned to Biberach 1752. At this time Klopstock's example had extraordinary influence on him, so that he gave himself up to a mystical piety, foreign to his nature, to which he gives utterance in the *Empfindungen des Christen* (The Christian's Experiences). While in this mood, an invitation from Bodmer induced him to go to Zürich. The episode from the *Cyropaideia* of Xenophon, *Araspes und Panthea* (about 1759), revealed Wieland in a quite new mood as the poet of love. In 1760 he received an appointment in Biberach in connection with the law courts. At this period he engaged in the difficult task of translating Shakespeare (8 vols. Zür. 1762-66).

Wieland now spent much of his time at Warthausen, near Biberach, the estate of the Count von Stadion, an accomplished man, but thoroughly averse to religious earnestness. Here Wieland became imbued with that Modern French philosophy which runs through the most of his later writings. In some of these there is an unmistakable tendency to licentiousness, from which his personal life remained free; in many of them he has blended the Greek sensibility to outward impressions with the French love of pleasure into a graceful philosophy of life. The first production which bears the impress of this French-Greek sensuousness was the poetical tale *Nadine*. In 1766 and 1767, *Agathon*, a romance in 3 vols. (1766-7), greatly extended Wieland's fame. In the didactic poem *Musarion* (1768) he advocated a carefully balanced gratification of all legitimate impulses—which seems to have been his highest ideal of conduct. In 1765 he married a lady of Augsburg; and he accepted a call to Erfurt (1769), as professor of philosophy.

A period of leisure and of undisturbed work began for Wieland, when the widowed Duchess Anna Amalie invited him to Weimar (1772), as tutor to her two sons, with the status of Hofrath and a salary of 1,000 thalers. Here he wrote his vaudeville, *Die Wahl des Hercules* (The Choice of Hercules); and the lyrical drama *Alceste*

(1773). Of greater importance for German literature was the publication of the *German Mercury*, a monthly periodical, for which Wieland wrote constantly for many years. His letters on his *Alceste* in the *Mercury* (1773 Sep.) show the tendency to the narrowness and shallowness of the French philosophy of that time, at which Goethe and Herder were so much offended. His prodigious literary productiveness showed itself notably in the *Geschichte der Abderiten* (History of the Abderites, 1773), a charming work, depicting the follies of small communities; in a series of tales and stories; in *Oberon*, a romantic heroic poem, the most perfect and enduring of his greater works (1780, last ed. Leip. 1853); in his trans. of Horace (*Letters*, 1782; *Satires*, 1786) and of Lucian (1788); and in his complete sketch of his conception of the Greek world in the *Aristippe* (1800). A collected edition of Wieland's works to 1802, 36 vols., with 6 supplementary vols. in large quarto and large and small octavo—new ed. with the poet's life, 53 vols. 1828, 36 vols. 1839) was published in Leipzig. From the proceeds Wieland was enabled to buy the estate of Osmannstädt, near Weimar, where he lived 1798-1803 in the circle of his numerous family. His *Attic Museum* (1796-1804) and the *Neue Attic Museum* (1805-09) were attempts to make his countrymen familiar with Greek poetry, philosophy, and rhetoric. In 1803 he returned to Weimar, where he died.

Wieland had neither the spirit of a reformer like Klopstock and Lessing, nor did he attain the poetical greatness of Goethe or Schiller; and he was not profound as critic; nevertheless, he did great service to German literature—giving to German poetry the still lacking grace and harmony of expression and versification. The school of romantic German poetry is indebted to him for its origin.—Compare besides, Gruber's *Biographie Wieland's* (4 vols. Leip. 1827; vols. 50-53 of the *Works*), *Wieland's ausgewählte Briefe* (4 vols. Zür. 1815), *Auswahl denkwürdiger Briefe* (2 vols. Wien 1815), and *Briefe an Sophie Laroche* (Berl. 1820); also Löbell's *C. F. Wieland* (1858).

WIELD, v. *wēld* [AS. *wealdan;* Goth. *valdan;* Ger. *walten;* Icel. *valda;* Dan. *volde*, to rule, to dispose of]: to use with full command or power that which is not too heavy or too difficult for the holder; to manage; to handle; to employ. WIELD'ING, imp. WIELD'ED, pp. WIELD'LESS, a. *-lĕs*, unmanageable. WIELD'ABLE, a. *-ă-bl*, manageable. WIELD'ER, n. *-ėr*. one who wields. WIELDY, a. *wēld'ĭ*, that may be wielded; manageable.

WIE'NER-NEU'STADT. See NEUSTADT, or WIENER-NEUSTADT.

WIER, n. *wēr:* same as WEIR.

WIERY, a. *wēr'ĭ* or *wīr'ĭ* [Ger. *wehr*, a dam (see WEIR)]: in *OE.*, wet; moist.

WI'ERY. See WIRY (under WIRE).

WIESBA'DEN: district in Prussia; till 1866 (in large part) the duchy of Nassau (q.v.): see also HESSE-CASSEL.

WIESBADEN, *ēs-bâ'dĕn:* chief town of the Prussian dist. of Wiesbaden, province of Hesse-Nassau (formerly the independent duchy of Nassau); one of the oldest and most famous German watering-places; delightfully situated on the s. slopes of Mt. Taunus, 26 m. w. of Frankfurt, 5 m. n.w. of Mainz by railway. Weisbaden has been called 'a city of lodging-houses,' and during the 'season' the number of visitors is greater than that of the residents. The town is well and regularly built. The *Kursaal* comprises, besides reading-rooms, etc., an extensive dining-hall which serves also as a ball-room. Other buildings are the *Schlösschen* (Little Palace), containing a library of 70,000 vols. and a collection of antiquities, in which are curious Roman *bassi-rilievi*, statues, altars, etc., found in the vicinity; a handsome Prot. church in Gothic style, finished 1860; the Grecian chapel, built by the Duke of Nassau as a mausoleum, in which the remains of his first wife lie; a Jewish synagogue in the Moorish style; etc. There are about 23 hot springs, all of high temperature, and numerous bathing-houses throughout the town; but the principal is the *Kochbrunnen* (Boiling-spring), the temperature of which is 156° F. The spring has all the appearance of a boiling cauldron, and so copiously does it pour forth its waters that, though they are used both for drinking and to supply the principal baths in the town, a vast quantity escapes, through gutters, sending up clouds of vapor in its passage along the streets, and adding to the warmth of the temperature of Weisbaden in summer. Next in heat and volume to the *Kochbrunnen* is the spring in the garden of the *Alder* (Eagle) Hotel, whose temperature is 134° F. The use of the Weisbaden hot springs is considered highly remedial for gout, rheumatism, scrofula, and skin diseases and nervous affections. The waters are saline, and contain silica and iron. Weisbaden, with its beautiful situation and environment, and its unfailing gayety during the season, is one of the two most popular of the German spas (for the other, see BADEN-BADEN). The public gaming-tables were abolished 1872. The season is from June to Sep., and the number of visitors annually is nearly 60,000.—Pop. (1900) 86,111.

Weisbaden is very ancient; its springs are the *Fontes Mattiaci* mentioned by Pliny. The Romans built a station here, and erected a fort on a hill on the n.w. side of the town, still known as the Römerberg, and which was garrisoned by the 22d Roman legion. The Mattiaci, a subdivision of the German tribe called the *Catti*, allied themselves with the Romans; but in the 3d c., the bar-

barian Germans rose against the Romans, and destroyed their forts, including Wiesbaden. Urns, tiles, coins, etc., are found abundantly wherever excavations are made; and that the Romans appreciated the virtues of the waters is proved by the remains of ancient baths, and by the votive tablets recording the thanks of Romans who had been restored to health by the waters, still preserved in the museum.

WIFE, n. *wīf, plu.* WIVES, *wīvz* [AS. *and* Icel. *wif;* Dut. *wijf;* Dan. *viv;* Ger. *weib,* a woman, a wife: in AS. the two sexes were distinguished as *wæpned-man,* the weapon-man, and *wif-man,* the wife-man—*wife* being supposed to be derived from *weaving*—the *sword* and the *distaff* being taken as the types of the two sexes]: a woman united to a man by marriage; in *Scot.,* a woman, as *fishwife,* old *wives'* tales. WIFE'HOOD, n. *-hŭd,* the state of being, or the qualities of, a wife. WIFE'LESS, a. *-lĕs,* without a wife; unmarried. WIFE'LY, a. *-lĭ,* becoming a wife.

WIFE. See HUSBAND AND WIFE; MARRIAGE.

WIG, v. *wĭg:* in *slang,* to censure severely; to scold. A GOOD WIGGING, a good scolding; a rating.

WIG, n. *wĭg* [a contraction of *periwig*]: an artificial covering of hair for the head, intended to disguise the natural hair, or to make up for lack of hair; an official head-dress worn by judges, barristers, etc., in Great Britain. WIGGED, a. *wĭgd,* wearing a wig. WIG'GERY, n. *-gĕr-ĭ,* the hair of which a wig is made. BIG-WIG, a great person; a magnate. EARWIG (see EARWIG).—The use of *Wigs,* or coverings of false hair for concealing baldness or for the supposed adornment of the head, appears to belong to all ages and countries. There is an Egyptian wig in the British Museum, supposed to be about 4,000 years old; and some of the South Sea islanders are said to be skilful wig-makers. Xenophon mentions that Astyages wore an immense wig. Several of the Roman emperors wore wigs, and Lampridius relates that the wig of Emperor Commodus was highly perfumed, and sprinkled with gold-dust. After this, there are no historical traces of the wig till about the end of the 14th c.; when wigs made their appearance in France, and gradually spread thence to other European countries. The fashion of wearing wigs became prevalent in the reign of Louis XIII. (1610-43), and for more than a century no gentleman of fashion could appear without one. Toward the end of the 18th c. the wig began to be superseded by the queue with Hair-powder (q.v.). Except by judges and barristers in England, wigs are now used only in cases of baldness, and they are made in imitation of nature, which was far from being the case with the wigs of old times.

WIGAN, *wĭg'an:* municipal and parliamentary borough of Lancashire, England; on the Douglas; 18 m.

n.e. of Liverpool, 18 m. w.n.w. of Manchester; 195 m. n.w. of London by railway. Originally rather irregularly built, Wigan has rapidly improved in its streets and buildings. It is well sewered and liberally supplied with water. The parish church of All Saints is an ancient stately edifice in the late Perpendicular style, rebuilt in great part 1847. There are 21 Anglican churches and chapels, 9 Roman Catholic, and 21 other places of worship. Wigan stands in a coal-field, where cannel coal abounds, and is an important manufacturing centre. Cotton-spinning, the manufacture of calicoes and other cotton goods, checks, and home-made linens, are extensively carried on. There are also brass and iron foundries, factories for edge-tools, chemical works, paper works, and flouring-mills. The river Douglas and the Leeds and Liverpool canal afford facilities for inland navigation. Pop. (1901) 60,770.

WIGEON, n. *wĭj'ŭn*: same as WIDGEON (q.v.).

WIGGIN, KATE DOUGLAS SMITH: American author: b. Philadelphia, Pa., 1857, Sept. 28. She was educated at Abbott Academy, Andover, Mass., and in 1876 went to California, where she studied the kindergarten system in Los Angeles, and later at San Francisco organized the first free kindergarten in the west. In 1880 she was married to S. B. Wiggin, a lawyer (d. 1889), and removed to New York. In 1895 Mrs. Wiggin was married to George C. Riggs. She published, with her sister, Nora A. Smith: *Froebel's Gifts* (1895); *Kindergarten Principles and Practice* (1896); etc. Her other works, several of which have attained great favor in this country and England, include: *The Bird's Christmas Carol* (1888); *The Story of Patsy* (1889); *A Cathedral Courtship* (1893); *Marm Lisa* (1896); *Penelope's Progress* (1898); *Penelope's Experience in Ireland* (1901); *Diary of a Goosegirl* (1902); *Rebecca of Sunnybrook Farm* (1903); *The Peabody Pew* and *The Flag Raising* (1907).

WIGGLESWORTH, *wĭg'glz-wėrth*, EDWARD: revolutionary soldier: 1742, Jan. 3—1826, Dec. 8; b. Ipswich, Mass.; grandson of Michael Wigglesworth. He was commissioned as colonel 1776, June; served as third in command of the fleet on Lake Champlain; returned to Newburyport, Mass., to raise a second regiment 1777; took part in the battle of Monmouth; and 1778 was president of a court of inquiry which investigated the surrender of Forts Montgomery and Clinton by Gov. George Clinton. He resigned 1779, and later was collector for the port of Newburyport, and 1818 received an annual pension of $240 from congress. He died at Newburyport.

WIG'GLESWORTH, EDWARD, D.D.: educator: 1693-1765, Jan. 16; b. Malden, Mass.; son of Michael Wigglesworth. After graduating at Harvard College 1710, he studied theology, and held the Hollis professorship of divinity at Harvard from its foundation 1722 till his

death. He became a member of the corporation of the college 1724. He was prominent in the Whitefield controversy, publishing *An Answer to Mr. Whitefield's Reply to the College Testimony* (1745), and *Distinguishing Characters of the Ordinary and Extraordinary Ministers of Christ* (1754). He served as commissioner of the London Society for Propagating the Gospel Among the Indians, resigning 1755. Dr. Wigglesworth was a man of learning, and his publications include sermons, lectures, and other religious works.

WIG'GLESWORTH, Michael: clergyman: 1631, Oct. 18—1705, June 10; b. England. He came to New England with his father 1638; graduated at Harvard 1651; and was tutor there 1652-54, meanwhile studying theology. He held the pastorate at Malden, Mass., 1656 till his death, but was compelled to relinquish preaching 1663-85 on account of ill health. During this interval he studied and practiced medicine, resuming pulpit work in addition 1686. He declined the presidency of Harvard College 1684. His poem, *The Day of Doom, or a Description of the Great and Last Judgment* (1662), had great popularity, and reached 10 editions in this country (last edition by William Henry Burr 1867): it vividly reflects the stern Calvinism of his day. Other poems of Wigglesworth are: *God's Controversy with New England, written in the Time of the Great Drought, anno* 1662; *Meat Out of the Eater, or Meditations Concerning the Necessity, End, and Usefulness of Affliction to God's Children* (1669); and an elegy on the death of the Rev. Benjamin Bunker.

WIGHT, n. *wīt* [Dut. *wicht,* a child: AS. *wiht,* a creature, animal, person: Ger. *wicht,* a being, a wretch: Dan. *vætte,* an elf]: a creature; a man; a person; a human being.

WIGHT, a. *wīt* [Sw. *wig,* nimble: Icel. *vigr,* able to fight]: in *OE.,* active; swift; strong; brave. Wightly, ad. *wīt'lĭ,* in *OE.,* swiftly; nimbly; vigorously.

WIGHT, *wīt,* Isle of: island in the English Channel, noted for variety and beauty of scenery, and mildness and salubrity of climate. It forms part of Hampshire on the s. coast of England, and is separated from it by a channel called the Solent, which varies in width from 1 to more than 6 m., and which spreads out to the e. into the broad and safe anchorage of *Spithead* and *St. Helen's Roads.* Its form is remarkably regular, its longer and shorter diameters (22 m. and 13¾ m. in length respectively) running almost due e. and w., and n. and s. In shape the isle is rhomboidal, and has been compared to a bird with expanded wings or to a turbot. It is 56 m. in circuit, and, including its inlets, covers 98,320 acres. *Newport* is the capital; the other chief towns are *Ryde, Cowes,* and *Ventnor* (see these titles), of which the first and last have sprung up from small villages

within the 19th century. *Yarmouth* is a small decayed town near the w. extremity of the island, and *Newtown*, on the n.w. coast, formerly an important town, is now an insignificant hamlet. On the s.e. coast, the delightful health resorts of *Sandown* and *Shanklin* have acquired the size and importance of towns. Railway communication has been opened between Ryde and Ventnor, and between Cowes and Newport. Throughout the island there are good though generally narrow roads, mostly picturesque and bounded by hedge-rows. The chief physical feature of the island, to which it owes its shape and much of its beauty, is a long undulating range of chalk downs, extending from the *Culver Cliffs* on the e. to the *Needles* on the w., rising to its greatest elevation in Mottiston Down, 661 ft. (Ashey Down is 424 ft., and Bembridge Down 355 ft.) above sea-level. The river Medina, rising near the s. extremity of the island, flows n. through a gap in this range, expands into a tidal estuary below Newport, and flows into the Solent at Cowes, and divides the island into the hundreds or liberties of East and West Medina, excluding the two boroughs of Newport and Ryde. Another range of chalk downs of greater elevation—St. Boniface Down, 783 ft., Dunnose (Shanklin Down), 771 ft., St. Catherine's, 769 ft.—rises at the s. point of the island, and expands into a broad promontory, whose s. face forms the picturesque district known as the *Undercliff*, or 'Back of the Island,' of which Ventnor is the capital. This district owes its remarkable beauty to a series of land-slips on a large scale, of prehistoric date, which have laid bare a long wall of rugged cliff, below which a succession of sunny terraces, due to the gradual subsidence of the strata, slope gently down to the sea. This part of the island is completely sheltered from the colder winds, and is well suited as a place of residence for invalids suffering from consumption or any disease of the respiratory organs. Its remarkable healthfulness is attested by the official death-rate—the lowest in the kingdom; while the mildness of its climate is evidenced by the luxuriance of the myrtles, fuchsias, sweet-scented verbenas, and other exotics, which live through the winter without protection. The Isle of Wight is a great summer resort, though the heat is sometimes great.

The geology of the Isle of Wight is interesting. The great variety of strata displayed within so small an area, under circumstances favorable for examination, renders it one of the best available localities for the young observer. The n. side presents a succession of Tertiary or Eocene strata, including beds of fresh-water limestone, extensively worked for building-stone for many centuries, and based on beds of London and Plastic Clay. In Alum Bay, at the w. extremity of the island, the rapid succession of vertical layers of sand and clays of bright and varied hues, produces a singular and beauti-

ful effect. The central ridge or backbone consists of strata of chalk imbedding layers of flints, and the underlying formations in an almost vertical position. Isolated masses of chalk that, in consequence of their superior hardness, have survived the marine and atmospheric waste, form the well-known *Needles*, at the w. opening of the Solent, and the picturesque rocks of Freshwater Bay. The downs at the s. of the island belong to the same formation, but here the strata have been undisturbed, and are nearly horizontal. The cliffs of the Undercliff are of the Upper Greensand, or Firestone, underlying the chalk. Below this comes the Gault, or Blue Marl. To the action of the land-springs on this unctuous formation, the land-slips to which the Back of the Island owes its beauty are due. The Lower Greensand succeeds the gault, occupying the greater part of the area between the n. and s. chalk downs. This forms excellent grain-land, and presents a wall of cliff to the sea, diversified with many narrow picturesque gorges, locally known as *Chines*, where a small rivulet has eaten away the friable strata. The chief of these are those of Shanklin, Luccombe, Blackgang, and Whale China. The freshwater Wealden formation is the lowest visible in the island, and is seen in the cliffs of Brook to the w., and of Redcliff Bay to the e. Bones of the colossal iguanodon and other saurians are found in this formation.

The *soil* of the island is varied in nature and fertility. That of the n. half is, to a considerable extent, a cold, stiff clay, more suited for the growth of wood, especially oak, than of grain. Farming is still somewhat primitive; even on some large farms the flail is still in use. The soil of the s. half is chiefly a red loam, exceedingly productive, especially of barley, and, in the more rich and sheltered lands, of *white* wheat. *Red* wheat is grown in abundance in other parts of the island; while the stiffer clays of the n. grow excellent crops of oats. The chalk downs afford pasturage for sheep, famed for pureness of wool, and which furnish the London market with early lamb. The chief exports are wool, grain, flour, cement stones (septaria), and white glass-house sand. The principal communication between the mainland and the island is by steamboats daily between Portsmouth and Ryde, at both of which places there are good landing-piers. Pop. (1901) 82,388.

The *history* of the Isle of Wight presents few points of interest. It is supposed to have been the tin mart of the Greek traders mentioned under the name *Ictis* by Diodorus Siculus. The Romans knew it as *Vecta* or *Vectis*, which is merely the Latinized form of the native name. It was conquered for the Romans by Vespasian in the reign of Claudius (A.D. 43). Cerdic, founder of the kingdom of Wessex, took the island 530, and transferred it to his nephews, Stuf and Wihtgar.

In 661 it was reduced by Wulphere of Mercia, and given to Ethelwold, King of Sussex, from whom it was wrested (686) by Ceadwalla of Wessex, to whom, under the benign influence of Wilfrid, archbishop of York, the island owes the introduction of Christianity. During the three centuries preceding the Norman Conquest, it was repeatedly devastated by the Danish pirates, who made it their stronghold, to which they retired with their plunder. William the Conqueror gave it to his kinsman, Fitz-Osborne; Henry I. transferred it to the family of De Redvers, in whose hands it remained till the reign of Edward I., when it passed by sale to the crown. During the French wars of Edward III. and his successors, the island was repeatedly invaded and pillaged by the French. At the close of the reign of Henry VIII., the armada dispatched by Francis I., under command of D'Annebault, made several landings on the coast, and inflicted some damage, but was ultimately driven back by the prowess of the islanders. The most interesting event in the history of the island is the imprisonment of Charles I. in the castle of Carisbrooke, after his flight from Hampton Court (1647, Nov. 23—1648, Sept. 15). Carisbrooke was also the place of the imprisonment of his children, Prince Henry and the Princess Elizabeth, the latter of whom died there, and was buried in Newport Church, where a beautiful monument by Baron Marochetti has been erected to her memory by Queen Victoria.

The antiquities are not numerous. Sepulchral barrows occur on the downs, and Saxon burial-places have been discovered. There are the remains of a Roman villa, with a tesselated pavement, at Carisbrooke. The remains of Quarr Abbey, near Ryde, are very scanty. Carisbrooke Castle is a fine ruin, occupying a commanding position.

WIGHT, *wīt*, Orlando Williams: American physician and translator: b. Centreville, N. Y., 1824, Feb. 10; d. Detroit, Mich., 1888, Oct. 19. He was educated at the Rochester Collegiate Institute, removed to New York in 1847, studied theology and was ordained to the Universalist ministry. He subsequently studied medicine, being graduated from the Long Island College Hospital in 1865. He engaged as a medical practitioner in Wisconsin, and was appointed state geologist and surgeon-general in 1874. He was health commissioner of Milwaukee in 1878-80, and health officer of Detroit in 1882-8. He was a noted translator and throughout his life devoted a large share of his time to literary work. He wrote: *Maxims of Public Health* (1884); *Peoples and Countries Visited* (1888); etc. His translations include: *History of Modern Philosophy*, with F. W. Ricord (1852); *Lives and Letters of Abélard and Héloïse* (new ed., 1861); Martin's *History of France*, with Mary L. Booth (1863); etc. He also edited *Standard French*

Classics (14 vols., 1858-60); *The Household Library* (18 vols., 1859, *et seq.*); etc.

WIGHT, PETER BONNETT: American architect: b. New York 1838, Aug. 1. He was graduated from the College of the City of New York in 1855, practiced as an architect in New York in 1861-71, and since 1871 in Chicago. He has been secretary of the Illinois state board of architects since 1897, was elected to the American Institute of Architects in 1866, and was secretary of the Municipal Art League of Chicago 1900-5.

WIGTOWN.

WIG'TOWN, or WIG'TON: county forming the s.w. corner of Scotland; bounded w. by the Irish Channel, n. by Ayrshire, e. by the Stewartry of Kirkcudbright and the Solway Firth, s. by the Irish Sea; extent e. to w. about 33 m., n. to s. about 26 m., 485½ sq.m.—about 46 per cent arable. This county, which constitutes Wigtown Galloway, was formed about 1341; 54° 38′—55° 4′ n. lat., and 4° 16′—5° 6′ w. long. Wigtown is somewhat irregular in form, being deeply intersected by two arms of the sea, one of which, Loch Ryan, a long narrow inlet, stretches s. from the n.w. corner for 9 m. into the county, while Luce Bay on the s. makes a wide indentation 18 m. long, with an average width of 12 m., the heads of the inlet and bay being only 6 m. apart. The w. part of Wigtown, known as the *Rhins of Galloway*, thus forms a peninsula whose length (n. to s.) is 28 m., and breadth 1½—6 m.; its n. extremity is Corsewall Point, and its s. the Mull of Galloway, each promontory being provided with a light-house. The s.e. half of Wigtown is separated from the Stewartry of Kirkcudbright by Wigtown Bay, 15 m. long and 14 wide at its mouth, and between this bay and Luce Bay Wigtown extends s. in a blunt triangular form, terminating in Burrow Head. Wigtown is irregular in surface, but with no eminences exceeding 500 ft. The soil is varied, and—except a portion along the sea-shore, especially in the s.e., which consists of a rich loam—the quality is inferior. The climate is mild, but moist, the rainfall being comparatively great. There are many dairy establishments. Wigtown contains three rivers of considerable size; the Cree, the Bladnoch, and the Luce—the Cree and Bladnoch navigable for a few miles. Small fresh-water lochs are numerous. There were at an early period many religious houses in the country; and the church, believed to be the oldest in Scotland, founded by St. Ninian, was built near the site of the present village of Whithorn. The

principal towns are Wigtown, Newton-Stewart, Stranraer, and Whithorn. There is no mineral wealth, and little trade or manufacture. Pop. (1901) 32,685.

WIGWAM, n. *wĭg'wŏm* [Amer.-Indian, *wekou-om-ut*, in his or their house—from *wek*, his house]: the tent or lodge of a North American Indian, generally conical in shape.

WILBERFORCE, *wĭl'bĕr-fōrss*, SAMUEL, D.D.: bishop of the English Church: 1805, Sept. 7—1873, July 19; b. Clapham, England; third son of the philanthropist William Wilberforce. He was educated at Oxford, attaining high rank in classics and mathematics. Ordained 1828, he was successively curate of Checkendon and of Brightstone (Isle of Wight), rector of Alverstoke, and archdeacon of Surrey with canonship of Winchester Cathedral. Honors came rapidly: he was made chaplain to the prince consort 1843; subalmoner to the queen 1844; dean of Westminster 1845; and bishop of Oxford the same year, which office he held until 1869, when he was translated to the see of Winchester. As early as 1841 he was Bampton lecturer. As bishop he was zealously active in diocesan duty, in ecclesiastical assemblies, and in the house of lords, where he made able speeches on the admission of Jews to parliament, the 'Deceased Wife's Sister's Bill,' the revival of the powers of convocation, and in favor of the repeal of the Corn Laws. In his diocese he labored to promote benevolent objects, the improvement of schools; and, before that, as rector for establishment of a training college for young clergymen. He was an eloquent preacher rather than a learned divine, and for some years was regarded as the leader of the high-church party. His publications in book-form were few: a *History of the Episcopal Church in America;* and some popular religious allegories, such as *Abathos* and *The Rocky Island.* With his brother Robert, he published the *Life and Correspondence* of his father. He was killed by falling from his horse while riding with Earl Granville near Dorking.

WIL'BERFORCE, WILLIAM: English philanthropist, prominent in the movement for abolition of the slave-trade: 1759, Aug. 24—1833, July 29; b. Hull; son of a wealthy merchant. descended from an old family, proprietors of Wilberfoss, in the E. Riding of York. Wilberforce, at the age of nine, on his father's death, was sent to school at Wimbledon, where, under the care of a pious aunt, he ran the risk of becoming a Methodist; but his mother removed him to a Yorkshire school. where his religious impressions were dissipated by a life of gayety. His constitution was delicate, but he was quick and spirited, and fond of society, in which his lively conversation and musical talent made him a great favorite. While at school, he addressed a letter to a York paper 'in condemnation of the odious traffic in human flesh,' a subject which he seems never afterward to have

lost sight of. At 17 he entered St. John's College, Cambridge, and, though not a very diligent student, he passed his examination with credit. On attaining his majority he came into possession of a large fortune, and determined to enter parliament. In 1780 he was returned for Hull. He had known Pitt at Cambridge, and in London they became inseparable friends; Wilberforce, in parliament, however, remained independent of party. The elevation of Pitt to the premiership gave him opportunity of taking office, but he declined; though he rendered efficient service to his friend. In 1784, March, on the eve of a dissolution, he spoke at a county meeting in York, called to vote an address against the Coalition Ministry; and such was the effect of his eloquence, that a resolution was passed by the freeholders asking him to stand for the county. He did so; and in spite of opposition from the great whig families, he was returned without a contest. Wilberforce's success in the leading county set an example to other constituencies, which was of great advantage to the Pitt ministry. In the autumn, Wilberforce made a tour on the continent with Dr. Isaac Milner, dean of Carlisle, during which the serious impressions of his youth seem to have been revived; he returned a convert to evangelical Christianity. In 1787 he turned from social gayety, devoting himself to founding an association for reformation of morals; and in the following year, while in poor health, he entered on his great struggle for abolition of the slave-trade, for which he thenceforward dedicated his whole time. Wilberforce had then recently made the acquaintance of Thomas Clarkson, by whom he was powerfully supported as well as influenced; he found the Quakers also waiting to help. In 1789 he first proposed the abolition of the slave-trade in the house of commons, and met, as he expected, with powerful opposition. In 1804 his bill was first carried through the commons; it was thrown out in the lords; and in the following year it was lost in the commons. But while Wilberforce was leading the movement in parliament, Clarkson was conducting the agitation throughout the country; and 1806 a resolution was moved by Fox, pledging the commons to a total abolition of the slave-trade in the following session. It was adopted by the lords. In 1804, Jan., just before the discussion began, a work had been published by Wilberforce against the slave-trade, which had a marked influence on public opinion and the subsequent debates. The bill was passed by the lords, and in the commons it was carried by an enthusiastic majority. Sir Samuel Romilly, who supported the measure, compared the feelings of Napoleon, then at the height of his glory, with those of the English philanthropist, 'who would that day lay his head upon his pillow, and remember that the slave-trade was no more,' and the whole house burst into applause, and greeted Wilberforce with enthusiastic

cheers. Wilberforce now sought to secure the abolition of the slave-trade abroad, and entered on an agitation for the total abolition of slavery itself. Declining health, however, compelled him 1825 to retire from parliament, in which, since 1812, he had sat for the borough of Bramber. The legislative movement against slavery was then intrusted to Sir T. Fowell Buxton, and three days before Wilberforce's death news was brought him that the Abolition bill had passed a second reading, and he thanked God that he had lived to see his countrymen spend 20 millions sterling in such a cause. He was buried as a national benefactor in Westminster Abbey. Wilberforce is the author of a *Practical View of Christianity* (1797), a serious plea for a more earnest type of Christian life and action among the higher and middle classes. In 1801 he established in London the *Christian Observer*. See *Life of Wilberforce*, by his sons.

WILBERFORCE UNIVERSITY: an institution for the education of the colored race located at Wilberforce, a suburb of Xenia, Ohio. It was founded in 1856 under the auspices of the African Methodist Episcopal Church. It includes the collegiate department, the normal department, the Payne Theological Seminary, a law department, the academic department, and music and commercial departments, and a Nurses' Training School. Women are admitted to all departments. The collegiate department offers two four years' courses, the classical and the scientific leading to the degrees A.B. and B.S. The Theological Seminary offers a three years' course and confers the degree of B.D. A practice school is connected with the work of the normal department. Industrial training is not included in the curriculum; students, however, care for their own rooms. Emphasis is placed upon the development of moral character; there are few rules for behavior and government, but these are strictly enforced. The grounds and buildings are valued at over $155,000; a new dormitory was built in 1900-1; the library contains 5,000 volumes. The students number 408, and the faculty 24.

WILBUR, *wĭl'bẽr*, HERVEY BACKUS, M.D.: philanthropist: 1820, Aug. 18—1883, May 1; b. Wendell, Mass.; son of the Rev. Hervey Wilber, biblical scholar and author. He graduated at Amherst College 1838, studied medicine, and practiced in Lowell and Barre, Mass. In the latter place he experimented in the education of idiots, and organized there 1848, July, the first school, still continued, for this class of unfortunates in the United States. His improvements on foreign methods were widely adopted. From 1854 until his death he was superintendent of the New York state asylum for idiots at Syracuse.—His brother, CHARLES TOPPAN WILBER, M.D., b. Newburyport, Mass., 1835, May 18, was connected with the last mentioned asylum, and assisted in founding the state asylum at Columbus, O. After serv-

ing as surgeon in the civil war, he was prominent in founding educational idiot asylums in Illinois, Michigan, Indiana, Iowa, Kansas, Nebraska, Minnesota, and other states; and established 1882 the only periodical devoted to the object, the *Philanthropical Index and Review.*

WILBUR, JOHN: American preacher of the Society of Friends: b. Hopkinton, R. I., 1774, July 17; d. there 1856, May 1. He was a teacher and surveyor, who was a strongly conservative member of the Society of Friends and opposed innovations which he believed to be at variance with the original doctrine of the society. For his alleged statements reflecting on J. J. Gurney, the English Quaker, he was denounced by several members of the Rhode Island yearly meeting of 1838. He was sustained by a large majority of his own (South Kingstown) monthly meeting; but that meeting was dissolved and its members added to the Greenwich meeting, by which he was formally disowned in 1843. This action was confirmed by the quarterly meeting and the Rhode Island yearly meeting. Wilbur's adherents then withdrew from the orthodox society in such numbers as to form an independent conservative yearly meeting whose members were styled Wilburites. Among Wilbur's writings, largely polemical, was *A Narrative and Exposition* (1845). *His Journal and Correspondence* appeared in 1859.

WIL'BURITES: a branch of the Society of Friends, or Quakers, who adopted the principles of the Rev. John Wilbur, and maintain an independent yearly meeting. Wilbur became a preacher of the Society of Friends, and took a strongly conservative stand against what he regarded as innovations antagonistic to the original doctrines of the society. He was also accused of making unjust charges against Joseph John Gurney, the noted English philanthropist and preacher of the Society of Friends, when Gurney visited the United States. Wilbur was sustained by his own monthly meeting of South Kingstown, but that meeting was dissolved and its members added to the Greenwich meeting. The latter disowned Wilbur, and its action was confirmed, after an earnest controversy, by the quarterly meeting and the Rhode Island yearly meeting. Wilbur's followers thereupon formed an independent meeting.

WILCOX, CADMUS MARCELLUS: American soldier: b. Wayne co., N. C., 1826, May 19; d. Washington, D. C., 1890, Dec. 2. He was graduated from West Point in 1846, served in the Mexican war, and in 1860 was promoted captain. In 1861 he resigned from the army and entered the service of the Confederacy. He participated in the first battle of Bull Run, was promoted brigadier-general in October, and in 1863 became major-general. He was engaged in the second battle of Bull Run, at Fredericksburg, Chancellorsville, Salem Heights, Gettys-

burg, and other important battles, and was present at the surrender at Appomattox Court-house. He was offered a commission as brigadier-general in the Egyptian army after the close of the civil war, but declined it. In 1886-9 he was chief of the division of railroads at the general land-office in Washington. He wrote: *Rifles and Rifle Practice* (1859); *translation Austrian Infantry Evolutions of the Line* (1860); and an excellent *History of the Mexican War,* the manuscript of which was completed and published by his niece, M. R. Wilcox (1892).

WILCOX, Ella Wheeler: American poet: b. Johnstown Centre, Wis., 1855. She was educated at the University of Wisconsin and in 1884 began her literary career by contributing to the periodical press, and her work has been widely read and extensively printed. *Poems of Passion* (1883) is perhaps her best known work. Among her other publications, in verse, are: *Drops of Water* (1872); *Maurine and Other Poems* (1876); *Poems of Pleasure* (1887); *The Beautiful Land of Nod* (1892); etc. She has also written the novels: *Mal Moulée* (1885); *A Double Life* (1890); *An Erring Woman's Love* (1892); *The Story of a Literary Career* (1904); *Poems of Sentiment* (1906); etc.

WILCOX, Robert William: American legislator: b. Kuhulu, Honolulu, Hawaii, 1855, Feb. 15; d. Honolulu, Hawaii, 1903, Oct. 24. He was educated in Hawaii and at the Royal Military Academy, Turin, Italy. He was a member of the native legislature, led the revolution to restore the old constitution in 1889, and in 1895 again commanded a revolution, on this occasion for the purpose of restoring Queen Liliuokalani to the throne. He was captured and sentenced to death, but through the mediation of the United States congress the sentence was commuted to 35 years' imprisonment and $10,000 fine. He was pardoned, conditionally in 1896, and fully in 1898, by President Dole. He was elected a delegate to the United States congress in 1901 and served one term.

WILD, a. *wīld* [*rell. villr,* wandering at large: Dan. *vild,* wild: Dut. *wild,* proud, savage: Scot. *wĭld.* confused, bewildered: W. *gwill,* one that wanders about]: in a state of nature; not tamed or domesticated: N. an uncultivated tract of land; a desert; in *OE.,* a weald. Wild'ish, a. *-ĭsh,* somewhat wild. Wild'ly, ad. *-lĭ,* in a wild manner. Wild'ness, n. *-nĕs,* rough uncultivated state; state of being untamed; rudeness; irregularity of manners; absence of prudence; indulgence in profligacy; in *OE.,* alienation of mind. Wild boar, a wild animal of the hog kind, from which the swine of the farm-yard are descended. Wild Cat, n. ferocious animal of the cat kind (see Lynx [Bay Lynx]): Adj. reckless; wild; unsound or unstable, as *wild-cat* schemes, *wild-cat* banking. Wild'fire, inflammable materials difficult to quench after being fired; a disease in sheep in which there is inflammation of the skin; a sort of lightning unaccompanied by

thunder. WILD GOOSE CHASE, the pursuit of something as likely to be caught as the wild goose. WILD HONEY, honey found in the forest in hollow trees or rocks. WILD OATS, an oat-like kind of wild grass. TO SOW ONE'S WILD OATS, to pass in early manhood through a period of wild and reckless dissipation. WILD'ING, n. a wild crab-apple; a tree that grows without cultivation: ADJ. wild; uncultivated. WILDERNESS, n. *wĭl'dẽr-nĕs* [AS. *wilder*, a wild animal]: an uncultivated or desert region; a desert; in *OE.*, the state of being wild confusion.—SYN. of 'wild, a.': turbulent; licentious; uncultivated; untamed; inconstant; mutable; fickle; inordinate; loose; uncouth; strange.

WILD, JONATHAN: English thief and informer: b. Wolverhampton, England, about 1682; d. London 1725, May 24. He was a Birmingham buckle-maker who in 1706 went to London intending to engage in his trade, but becoming involved in debt was imprisoned for four years, after which he became a receiver of stolen goods and an informer against such criminals as were not in his employ. He was hanged at Tyburn. He was the subject of Fielding's satire, *History of the Life of the Late Mr. Jonathan Wild the Great* (1743), and also appears in Ainsworth's novel, *Jack Shepherd*, as well as in various other tales and pretended biographies.

WILDBAD, *vĭlt'bât:* town of Würtemberg, Germany; 28 m. w. of Stuttgart, 14 m. e. of Baden-Baden, 32 m. s.s.e. of Carlsruhe, 18 m. of which are by railway to Pforzheim, and the remaining 14 by road through a beautiful portion of the Black Forest. It is noted for its thermal springs and baths, ranging from 90° to 100° F. The baths consist of numerous basins formed round the springs as they gush from the rocks, and floored with sand for the comfort of the bathers. From the fact that these baths are natural or *wild*, not artificial, the town derives its name. The waters are nearly pure, the principal ingredient being common salt. The season is from May till September, and the annual number of visitors is about 6,000. Goitre abounds here and in the neighboring close valleys of the Black Forest. Pop. (1900) 3,532.

WILD'BAD GAS'TEIN. See GASTEIN.

WILDCAT: any of the smaller species of feline animals (family *Felidæ*) in its feral condition; a lynx. The term is a general one, applying to all the smaller felines; but locally has usually some specific application. Thus in European books and speech the 'wildcat' properly and ordinarily means *Felis catus*, formerly well known in all forested districts from the British Isles to Siberia, and still to be found in the less settled districts of the continent south of Sweden, though extinct in Great Britain, France, and Italy; it is also numerous in northern Scotland. The wildcat is larger, heavier, and more strongly

built than the domestic cat (to which it has contributed little, if anything: see CAT), has a stouter head and shorter and thicker tail, which does not taper; besides other peculiarities. Its body is yellowish gray, with a dark stripe along the spine, and with numerous darkish stripes descending more or less vertically down the sides, marking the limbs transversely and forming rings around the tail. It is noted for its savagery, and thoroughly tamed examples are very rare, if any ever existed. Like most of the wild felines, the female makes her nest in a hollow tree, or cleft of rocks, in an abandoned crow's nest, or some similarly convenient place, and brings forth there in early summer an annual litter of young, which show the ferocity of their native disposition from the start.

WILD CHERRY: name given to two trees, also to a shrub, of the order *Rosaceæ*, genus *Prunus*. See CHERRY; BIRD-CHERRY; CHOKE-CHERRY.

WILDE, GEORGE FRANCIS FAXON: American naval officer: b. Braintree, Mass., 1845, Feb. 23. He was graduated from the United States Naval Academy in 1864 and in 1864-6 was attached to the Brazil squadron. He received promotion to lieutenant-commander in 1869, to commander in 1885, and while commanding the dispatch boat *Dolphin* in 1885-8 made a trip around the world, the *Dolphin* being the first steel vessel in the United States navy to accomplish that feat. He became captain in 1898, commanded the ram *Katahdin* in the Spanish-American war, and later, in command of the *Boston*, he landed the first marine troops ever landed in China, sending them to guard the legation at Peking. He captured Iloilo in the Philippine Islands in 1899, and was placed in command of the *Oregon* in that year. In 1900 he captured Vigan in the Philippines, and he was in command of the *Oregon* when she was grounded on an uncharted ledge of rock in the Pechili Gulf; was made rear-admiral 1904, and retired 1905.

WILDE, JANE FRANCESCA ELGEE, Lady ('Speranza'): Irish poet: b. Wexford, Ireland, 1826; d. Chelsea, England, 1896, Feb. 3. She was married to Sir William Robert Wills Wilde in 1851. Her literary career began in 1845 with her contributions in prose and verse to the *Nation*. The publication of her essay, *Jacta alea est*, under her pen-name 'Speranza,' was made the basis of the unsuccessful prosecution of the editor after the suppression of the *Nation* in 1848. Among her writings are: *Ugo Bassi* (1857); *Poems by Speranza* (1871); *Ancient Legends, Mystic Charms, and Superstitions of Ireland* (1887); *Notes on Men, Women, and Books* (1891); *Social Studies* (1893); etc.

WILDE, OSCAR (Fingal O'Flahertie Wills): Irish poet: b. Dublin, Ireland, 1856; d. Paris 1900, Nov. 30. His father was Sir William Wilde, a noted surgeon, and

his mother was Lady Jane Wilde. He was graduated from Oxford in 1878, winning the Newdigate prize for English verse. In 1879 he went to live in London, where he soon became the leader of the so-called æsthetic movement and was satirized by Du Maurier as 'Postlethwaite' in *Punch,* and by Gilbert in the opera of *Patience.* He visited this country in 1882, lecturing extensively on art topics, and later lectured similarly in his own country and in Paris. In 1895 he was convicted of a serious moral offense and condemned to penal servitude for two years. During his imprisonment he wrote *A Ballad of Reading Gaol,* a poem of great force, and *De Profundis,* published in 1905. His other published works include: *Poems* (1880); *The Picture of Dorian Gray,* a novel; *The Happy Prince and Other Tales* (1888); the tragedies *Guido Ferranti* (1890), and *The Duchess of Padua; Intentions, essays* (1891); *Lord Arthur Savile's Crimes, and Other Stories* (1891); *Lady Windermere's Fan; A Woman of No Importance;* and *The Importance of Being Earnest;* etc. His comedies are extremely clever, and his poems are characterized by melody of movement and beauty of thought.

WILDE, Richard Henry: American scholar: b. Dublin, Ireland, 1789, Sept. 24; d. New Orleans, La., 1847, Sept. 10. He came with his parents to the United States in 1797 and settled in Georgia, where he studied law, and in 1809 was admitted to the bar. He was elected attorney-general of his state and in 1815-17, 1824-5, and in 1827-35 was a member of congress. In 1844 he accepted the chair of constitutional law at the Louisiana State University. He wrote the widely popular poem, *My Life Is Like the Summer Rose,* and also published: *Conjectures and Researches Concerning the Love, Madness, and Imprisonment of Torquato Dante* (1842). His poem *Hesperia,* edited by his son, was published in 1867.

WILDER, *wīl'dėr,* Alexander, M.D.: American eclectic physician, author and journalist: b. Verona, N. Y., 1823, May 14; d. 1908, Sept. 19. He was graduated at Syracuse Medical College in 1850, and in 1852 began an editorial career on the Syracuse *Star,* being subsequently connected with the Syracuse *Journal* (1853), New York *Teacher* (1856), and New York *Evening Post* (1858-71). He was an anti-Tweed alderman in New York in 1872, inspector of schools in 1873, and from 1875 to 1895 secretary of the National Eclectic Medical Association, editing 19 volumes of *Transaction.* He was president (1907) of the New York School of Philosophy. Among his published works are: *Secret of Immortality Revealed* (1846); *Neo-Platonism and Alchemy* (1869); *Our Darwinian Cousins* (1873); *Eleusinian and Bacchic Mysteries* (1874); *Ancient Symbol Worship* (1874); *Serpent and Siva Worship* (1875); *Vaccination, a Fallacy* (1879); *Psychology as a Science* (1844); *The Soul*

(1884); *Higher Sources of Knowledge* (1884); *Ethics and Philosophy of the Zoroasters* (1885); *Ancient Symbolism and Serpent Worship* (1886); *Later Platonists* (1887); *Antecedent Life* (1895); *The Ganglionic Nervous System* (1900); *Perennial Life* (1902); *History of Medicine* (1902). He has translated and edited *Iambliehus on Egyptian Mysteries* (1902); *Plato and His Doctrines* (1904); *Exigesis of Love* (1906); *Evil* (1907).

WILDER, *wīld'ėr,* BURT GREEN, M.D.: comparative anatomist: b. Boston, Mass., 1841, Aug. 11. He graduated from the Lawrence Scientific School 1862; in 1862-65 was in surgical service in the army; graduated M.D. from the medical department of Harvard 1866; and since 1867 has been professor of physiology, zoology, and comparative anatomy in Cornell University. Some of his first investigations were on abnormities such as supernumerary digits. For the past 12 years he has made the brain of vertebrates his specialty, has published numerous papers in American and foreign serials, and has been president of the American Neurological Society. He has given courses of lectures in a number of leading institutions east and west. He has published: *What Young People Should Know* (1875); and *Emergencies: How to Avoid and How to Meet Them* (1879); *Physiology Practicums* (1895); *Health Notes for Students* (1883); and, as co-author, *Anatomy of the Domestic Cat* (1882); *The Brain of the Sheep* (1903); also many papers on scientific subjects.

WILDER, MARSHALL PINCKNEY: American professional entertainer: b. Geneva, N. Y., 1859, Sept. 19. His occupation was at first that of a stenographer, but he abandoned it in order to become a drawing-room entertainer, in which capacity he has been widely popular. He has published *People I've Smiled With; The Sunny Side of the Street* (1905).

WILD'ER, MARSHALL PINCKNEY: experimental horticulturist: 1798, Sept. 22—1886, Dec. 16; b. Rindge, N. H. A fortune gained in wholesale trade in Boston enabled him to devote time and money to fruit-culture at his place in Dorchester, on which subject he published valuable papers in horticultural and other journals and reports. He was president of societies, both state and national, pertaining to this interest and to agriculture; also president of the New England Historico-genealogical Society, and of the Massachusetts senate (1850), besides holding other important offices. He was a man of noble presence and wide popularity. Among his many publications were: *California* (1871); *The Hybridization of Plants* (1872); *The Progress and Influence of Rural Art* (1872).

WILDERNESS, BATTLES OF THE: series of engagements, 1864, May, between the Union troops and the

WILDERNESS.

Army of the Potomac under Gen. Grant and the Confederate troops in the Army of N. Virginia under Gen. Lee, in the wild tract of country in Orange and Spottsylvania cos., Va., bordering on the Rapidan river. The designation is usually applied to engagements extending May 5—June 1, and including the battles of Spottsylvania (May 8-21) and those of North Anna (May 23-26), and by some military writers the second battle of Cold Harbor also (June 3); but the designation belongs properly to the fierce battles of May 5 and 6.—Early in 1864 the Confederates, who were familiar with the topography of the 'wilderness,' occupied a position on the s. side of the Rapidan, between Mile Run and Gordonsville, where Gen. Lee could both cover Richmond and threaten Washington. The Army of N. Virginia numbered about 60,000 effectives. Gen. Meade was in immediate command of the Army of the Potomac, which had about 130,000 men, of whom more than 100,000 were effectives. Gen. Grant made his headquarters with Gen. Meade in Mar., and planned a campaign having for its ultimate object the intervention of the Union army between the Confederates and Richmond. He designed passing through the 'wilderness,' but Gen. Lee, suspecting his intentions, prepared to give battle in that wild tract. In accordance with Grant's plans, Meade began moving his army toward the Rapidan, to cross it, May 4. Warren's (5th) and Sedgwick's (6th) corps crossed at Germanna ford, under cover of Wilson's div. of Sheridan's cav.; Hancock's (2d) corps crossed at Ely's ford, 6 m. below, under cover of the remainder of Sheridan's cav.; and Burnside's (9th) corps was left on the Orange and Alexandria railroad to check any sudden movement of the Confederates toward Washington. Lee was so thoroughly aware of Grant's movements that he advanced his own army to force a fight in the 'wilderness,' and for a time both armies were moving simultaneously toward each other. May 4 Grant ordered an advance on Lee for the following morning; and at an early hour the 5th corps and the Confederate advance met, and had a severe fight, in which each force was in turn defeated, the Union force faring worst on account of the steady reinforcement of the Confederates during the encounter. Grant hurried supports (Sedgwick and Hancock) to Warren; the fighting was kept up till 4 P.M., without practical results to either side; both sides ceased firing temporarily and threw up defensive works only about 200 yards apart; and on the arrival of Hancock the fighting was renewed by the Union force and kept up till dark. During the night Grant brought up Burnside's corps, and Lee, Longstreet's corps and a div. of Hill's corps. Fighting was renewed at daybreak and was maintained till dark almost without interruption. Lee took advantage of a fire that had broken out in the woods and had forced the Union troops to abandon their breast-

works, to make a decisive assault. The Confederates charged and penetrated the Union lines, but were repulsed with heavy loss. Almost all the fighting of the two days was done with muskets, as the ground would not permit artil. movements. Though the results of the battles were in no wise decisive, the advantage manifestly was with Grant, as Lee had failed to check his movement toward Richmond, and had been repulsed in all his direct attacks. Both armies were too much exhausted for fighting on the third day. After dark, Grant began moving toward Spottsylvania Court House, 15 m. s.e.; but Lee, again anticipating him, moved for the same point, and by a superior knowledge of the country reached it first, and by the evening of the 8th had his whole force behind breast-works.

Though the narrative has thus covered the actual battles of the 'wilderness,' it is continued that the movement of which the battles of May 5 and 6 were unexpected incidents, may be understood. The Union advance was by cav. and the 5th corps (Warren's). It reached Spottsylvania Court-house early on the 8th, after several slight engagements on the way. The cav. was unable to hold its ground, till Warren came up, when the Confederates were forced back to the line of Longstreet's corps, where severe fighting occurred. Through the day the 5th corps was almost constantly in action, being joined in an unsuccessful attack at dark by the 6th corps. The following day (May 9) was spent by Grant in disposing his force for attack, and by Lee in strengthening his position. There was almost constant fighting through the day, and among the severe losses was Gen. John Sedgwick (q.v.), killed by a sharpshooter. Hancock attacked the Confederate left on the 10th, crossing the Po river to do so, and met with success till ordered back for an intended assault on the centre. His severest losses were while withdrawing from his advanced position; but he resisted a direct attack, and made a second successful one. Later in the day the 2d and 5th corps, with two of Hancock's divisions, made three unsuccessful assaults on the Confederate left centre, considered the strongest point of their position; and a part of the 6th corps carried the outer line of the enemy's intrenchments. May 12 Hancock carried the salient on the Confederate right centre, captured 4,000 men and 20 cannon, and resisted five attempts to dislodge him; but neither side gained any material advantage. At the same time Burnside was repulsed in an attack on the left, and Warren in another on the right. Several days were spent in maneuvers, and Grant, finding Lee's right unassailable, began moving his corps from the right to the left, intending to thus pass around Lee's right toward North Anna river. Lee adopted the same course, made several ineffectual attacks on Grant's right, and had his army in position on the s. bank of

the river when the Union army reached the n. bank (May 23). Hancock on the left, and Warren on the right, 4 m. apart, crossed the river and assaulted, while Burnside was repulsed in attempting to cross to take a position between Hancock and Warren. Warren was assaulted, but held his ground, and was reinforced by the 6th corps.

Unable to dislodge the enemy, Grant withdrew to the n. bank at night (26th), and resumed his tactics to turn the enemy's position by his right, marching to the Pamunkey river, and crossing it. Lee also pursued his former course, and, following a shorter line, reached Cold Harbor, on the Chickahominy, and was intrenched there before Grant arrived.—For subsequent operations of the two armies, see CHICKAHOMINY, BATTLES OF THE; COLD HARBOR (SECOND), BATTLE OF.—In the above operations, the losses of the Union army, according to Gen. Meade's report, were 5,584 killed, 28,364 wounded, and 7,450 missing—total 41,398. This does not include Burnside's losses prior to his union with Meade (May 24). The Confederate losses were not officially reported, but are believed to have been less than half those of the Union army.

WILDERNESS ROUTE: in American history, a famous emigrant road or trail from the Atlantic seaboard to Ohio through Cumberland Gap. Thousands of emigrants passed over this road to Ohio and Kentucky. The 'Wilderness Road' was marked out by Daniel Boone. In 1775 the Transylvania Company, with Colonel Richard Henderson as head, engaged Boone to mark out a road from Fort Wautaga, on a branch of the Holston, to the Kentucky river, where the company's newly-purchased lands lay. 'This I accepted,' wrote Boone, 'and undertook to mark out a road in the best passage through the wilderness to Kentucky with such assistance as I thought necessary to employ for such an important undertaking.'

WILDES, FRANK: American naval officer: b. Boston, Mass., 1843, June 17; d. on steamer China, off San Francisco, Cal., 1903, Feb. 6. He was graduated from the United States Naval Academy in 1863, served in the West Gulf squadron, and later on the monitor Chickasaw. He was promoted master in 1866, became commander in 1880, was in charge of the Portsmouth, N. H., navy yard in 1885-8, and in 1894 was commissioned captain. He commanded the cruiser Boston at the Asiatic Station in 1895-8, and served under Dewey at the battle of Manila, 1898, May 1. In 1901 he was advanced to the grade of rear-admiral, was assigned to the Asiatic Station as junior squadron commander, and in 1903 was ordered home on sick-leave, but died on the way.

WILDEY, *wīl'dĭ*, THOMAS: 1783, Jan. 15—1861, Oct. 19; b. London. He came to America 1817, and 1819, Apr. 26, established Washington Lodge No. 1, in Balti-

more, the first lodge of Odd Fellows in this country. He was 'grand sire' of the grand lodge 1825-33; and 1826 visited England and obtained from the Manchester Unity an independent charter for the grand lodge of the United States. Members of the order have erected a monument to him in Baltimore.

WILDFOWL: in modern usage water-birds, as ducks, geese, and swans, pursued by gunners for sport or for market. American methods of wild fowling will be found given where these birds are described (see DUCK, etc.). An interesting method in Europe, still extensively pursued in some parts of England, at the Fens, is by decoying wild ducks in large trap-ponds. The pond is constructed in a secluded place, well sheltered by trees, and with a plentiful supply of reeds and sedges. From this pond pipes or narrow passages are led, 60 to 80 yards, gradually narrowing toward the termination. Above, the pipe is bridged and covered by a light network, and at its termination it ends in a tunnel net, which is, as a rule, carried out on to the land. Decoy ducks, which come to be fed at the call of the attendants, are used to entice their wild neighbors into the pipe; but the decoy dog is perhaps a more valuable ally of the fowler. This dog is named a 'piper.' It is of a small breed, and indulges in playful gambols by the side of the pipe, appearing now and then in advance of the fowl, which, led by curiosity, swims onward toward the dog, and is thus drawn toward the terminal net. The dog preserves a perfect silence during its maneuvers. Devices of the same character are used in the Orient, especially in Japan. Another Old World method is by employing the stalking horse, still used in some parts of England; the body of the horse—which requires special training for its work—being used to conceal the sportsman from the game. While correct terms are applied to landbirds, water-fowl are generally spoken of as 'flocks.' The correct terms are as follows: A herd of swans: a gaggle of geese (on the water): a skein of geese (on wing): a paddling of ducks (on the water): a team of wild-ducks (flying): a sord or suit of mallards: a company of widgeons: a flight or rush of dun-birds: a spring of teal: a dopping of sheldrakes: a covert of coots: a herd of curlews: a sedge of herons: a wing or congregation of plovers: a desert of lapwings: a walk of snipes: a fling of oxbirds: a hill of ruffs. A small number of wild-fowl, e.g., ducks and geese (about 30 or 40), is termed a 'trip.' A like number of widgeon, dun-birds, or teal, is termed a 'bunch'; and a smaller number (10 to 20) is called a 'little knob.' Of swans, it would be said, a 'small herd'; and sometimes of geese, a 'little gaggle,' or a 'small skein'; and so of ducks, a 'short' or 'long team.' Consult: Sanford and Van Dyke, *Water Fowl*, American Sportsmen's Library (New York, 1903); Grinnell, *American Duck-shooting* (New York, 1901);

Elliot, *The Wild Fowl of the United States, etc.* (New York, 1898); Mayer, *Sport with Rod and Gun* (New York, 1892); Aflalo, *Sport in Europe* (London, 1901).

WILD HUNT (Ger. *Wilde* or *Wüthende Jagd;* also *Wildes* or *Wüthendes Heer,* Wild or Maddening Host; *Nachtjäger,* Night Huntsman, etc.): in an ancient and still popular German superstition, a fancied noise sometimes heard in the air at night, as of a host of spirits rushing along over woods, fields, and villages, accompanied by shouting of huntsmen and baying of dogs. Among the German people the stories of the Wild Huntsman are numerous and widespread: though varying in detail, they are uniform in essential traits. The root of the whole notion is discernible in the expression used by the peasants of Lower Germany when they hear a howling in the air, 'Wode hunts' (*Wode jaget*), that is, Wodan or Odin marches, as of old, at the head of his battle-maidens, the Walkyries (q.v.), and of the heroes of Walhalla; for the old heathen gods were not fully dislodged from the imaginations of the people by Christianity, but were degraded into ghosts or demons. As the celestial god Wodan, lord of all atmospheric and weather phenomena, and consequently of storms, was conceived as mounted on horseback, clad in a wide dark cloak, and with a broad-brimmed hat; the Wild Huntsman also appears on horseback, in hat and cloak, and is accompanied by a train of spirits—the ghosts of drunkards, suicides, and other malefactors, often without heads, or otherwise shockingly mutilated. On very rare occasions, the Wold Huntsman shows kindness to the wanderer whom he meets; but generally he brings hurt or destruction, especially to any one rash enough to address him, or join in the hunting cry. Whoever remains standing in the middle of the highway, or steps aside into a tilled field, or throws himself in silence on the earth, escapes the danger. In many districts, heroes of the older or of the more modern legends take the place of Odin. The legend has also in recent times attached itself to individual sportsmen, who, as a punishment for their immoderate addiction to sport, or for their cruelty in it, or for hunting on Sunday, were believed to have been condemned henceforth to follow the chase by night. In Lower Germany there are many such stories of one Hakkelberend, whose tomb is shown in several places: still the very name leads back to the myth of Wodan, for Hakkelberend means literally the mantle-bearer. The appearing of the Wild Hunter is not confined to any particular season, but is most frequent in the 12 days between Christmas and Epiphany.

Another version of the Wild Hunt is found in the legend prevalent in Thuringia and the district of Mansfeld. There the procession, formed partly of children who had died unbaptized, and headed by Frau Holle or Holda (see BERCHTA), was believed to pass yearly

through the country on Holy Thursday—an old man, with white hair, the faithful Eckhart (see TANHAUSER and VENUSBERG) preceded the spirit-host, to warn the people to keep out of the way, that they might not come to hurt. This host of Holda or Berchta also prefers the season about Epiphany. In one form or other, the legend of the Wild Hunt is spread over all German countries, and is found also in France, and even in Spain. In Lower Germany it has been preserved in an older and purer form than in Upper Germany. It has probably some connection with Celtic mythology, but not apparently with the Slavonic.—See Grimm, *Deutsche Mythologie.*

WILD RICE. See RICE.

WILE, n. *wīl* [AS. *wíl,* a wile: Lith. *wylus,* deceit: the same word as *guile*]: a stratagem; a sly artifice; something intended to deceive or ensnare; deceit; fraud: V. in *OE.,* to deceive; to impose upon. WILY, a. *wī'lĕ,* full of wiles or tricks; artful; sly; crafty; cunning; subtle. WI'LILY, ad. *-lĭ.* WI'LINESS, n. *-nĕs,* cunning; guile.

WILEY, HARVEY WASHINGTON, PH.D., LL.D.: American chemist: b. Kent, Ind., 1847, Oct. 18. He was graduated from Hanover College in 1867; from the Indiana Medical College in 1872; from Harvard in 1873; and in 1878-9 studied abroad, chiefly at the University of Berlin. He was professor of chemistry at Purdue University in 1874-83, and in 1881-3 was also state chemist of Indiana. Since 1883 he has been chief chemist of the United States department of agriculture, occupying also the position of professor of agricultural chemistry at the graduate school of Columbia University since 1895. He has been secretary of the Association of Official Agricultural Chemists since 1889; was president of the American Chemical Society in 1893-5; and is connected with various other scientific organizations. He has made a specialty of sugar and glucose investigations and has been interested in the prevention of food adulteration. He has published: *Songs of Agricultural Chemists* (1892); *Principles and Practice of Agricultural Chemistry* (3 vols., 1894-7); *Foods and their Adulteration* (1907), and up till 1909, 60 Government Bulletins, and 225 scientific papers. His principal work was the securing of legislation to prevent adulteration of foods.

WILEY UNIVERSITY: an institution for the education of the colored race, located in Marshall, Texas. It was founded in 1873 by the Freedmen's Aid and Southern Educational Society of the Methodist Episcopal Church, by which it is now chiefly supported. It is open to both men and women. It has elementary, secondary, and collegiate departments, and normal, commercial, and industrial courses. The Collegiate Depart-

ment confers the degrees of A.B. and B.L. Industrial work and instruction is given in carpentry, bricklaying, printing, and sewing and cooking. The grounds and buildings are valued at $40,000; a building for general purposes was erected in 1900-1. The library contains 5,280 volumes; the students number 502, and the faculty 22.

WIL'FRID, or WILFRITH, SAINT: Anglo-Saxon prelate: b. about 634; d. Oundle, Northamptonshire, 709. He studied at Lindisfarne, became a monk and in 653 accompanied Benedict Biscop to Rome in order to obtain an authoritative answer to the question of the proper time for celebrating Easter. On his return he obtained from Alchfrid, king of Northumbria, a grant of land and a monastery at Ripon, and here he was ordained priest in 664. In this same year he took a leading part in the conference at Whitby, where he persuaded the king to decree that, in the celebration of Easter, the Roman usage should be substituted for that of the Scottish Church, which had hitheto prevailed in Northumbria. At this time also the king appointed him archbishop of York, but having gone to France to be consecrated by a bishop holding orthodox views on the Easter question, he found on his return that his see was occupied by one of the opposite party, and he did not get possession till 669. Becoming obnoxious to King Egfrid (who had succeeded Alchfrid in 670), the king, to reduce his influence, divided his diocese into three, and when Wilfrid opposed this proceeding, deprived him of his see altogether (678). Wilfrid thereupon set out for Rome to obtain from the pope a reversal of the king's act of deposition. Having been driven by a storm on the coast of Friesland, he preached to the people (who had no difficulty in understanding the Anglo-Saxon) with such effect that all the princes and many thousands of the people offered themselves for baptism. Having reached Rome he easily obtained from the pope the desired decision, but during the reign of Egfrid remained under persecution or in exile; in 687, however, Aldfrid, who had succeeded Egfrid, reinstated him. But Aldfrid also in course of time was offended by his devotion to Rome, and Wilfrid was again deposed in 691. He then made another journey to Rome, and did not return till 705.

WILHELM MEISTERS APPRENTICESHIP: a novel by Goethe. The first part was published in 1796, after having occupied Goethe's attention for 20 years; its sequel, *Wilhelm Meisters Wanderjahre* (travels) appeared 1821-9. The central idea of this great work is the development of the individual by means of the most varied experiences of life. There is no plot proper, but in a series of brilliant episodes the different stages of the hero's spiritual growth are brought before the reader. Wilhelm Meister is a young man with many admirable qualities of character, but passionate and emotional,

somewhat unstable, lacking reflection and proper knowledge of the world. The book gives a richly colored picture of the life of Goethe's time.

WIL'FUL, WIL'FULNESS. See under WILL 1.

WILHELMINA I., *vĭl-hĕl-mē'nâ* (WILHELMINA HELENE PAULINE MARIE): queen of the Netherlands: b. The Hague, 1880, Aug. 31. She is the daughter of King William III. of the Netherlands by his second wife, Emma of Waldeck. She became queen on the death of her father in 1890, but as she had not attained her majority her mother ruled as queen-regent; Wilhelmina meanwhile was carefully educated under the best tutors. Shortly after her 18th birthday, on Sep. 6, 1898, she was crowned queen at Amsterdam. Her charming personality and strength of character have made her very popular with her people; she has also been strongly influenced by her mother, who is equally well loved by the people. In Feb., 1901, she was married to Henry Frederick, Duke of Mecklenburg-Schwerin.

WILHELMSHAVEN, Germany: town and naval station, on the n. coast of the duchy of Oldenburg, at the w. entrance of the Bay of Jade; 40 m. n.w. of Bremen, with which it is connected by rail. In 1853 the land was bought from Oldenburg by Prussia, and the town laid out in 1856; it was first used as a naval station in the Franco-Prussian war, and since then has been made a fortress of the first rank. The harbor and fortifications have been built at great cost, as the ground is soft and marshy, and without natural advantages. The harbor basin, which is artificially constructed and walled with granite, is connected with the bay by a canal, and contains three large dry docks; it is defended by forts and provided with a torpedo station. The naval workshops are located here and naval stores are kept here. There is also a commercial harbor connected with the naval harbor, but the town has not yet attained any commercial importance. Pop. (1900) 22,570.

WIL'HELMSHOHE. See CASSEL.

WILIBRORD, or WILLIBROD, SAINT. See WILLIBROD.

WILKES, *wĭlks*, CHARLES: naval officer and explorer: 1798, Apr. 3—1877, Feb. 8; b. New York. He entered the navy 1818, and became lieutenant 1826. Assigned to the department of charts and instruments 1830, Wilkes was the first in this country to make observations with fixed astronomical instruments, which he had set up. In 1838, Aug. 18, he was made commander of an exploring expedition, by which the Samoan and Fiji Islands were carefully surveyed, and many other regions of the s. seas examined, including the Antarctic regions, where he made important discoveries. He published a *Narrative* of the expedition (5 vols. 1845) for which he received the gold medal of the Royal Geog. Soc. In 1849 he pub-

lished *Western America;* and 1856 *Theory of the Winds.* He was commissioned captain 1855. As commander of the United States steamer *San Jacinto,* 1861, he forcibly removed from the British mail-steamer *Trent* John Slidell and James M. Mason, commissioners of the Confederate States to Great Britain and France, and conveyed them to Boston, receiving the thanks of congress and the acclamations of the people; but at the demand of the British government, his act was disapproved by the executive authority of the United States, and the commissioners were surrendered to the jurisdiction from which they had been taken. The United States government based this surrender on the fact that, though the Confederate commissioners and their documents were liable to capture as contraband of war, the British vessel should have been taken into port for adjudication by a prize court; whereas Wilkes had taken off his prisoners and conveyed them to Fort Warren, in Boston Harbor—thus, as a judge, exercising the illegal 'right of search.' In 1862 he was promoted commodore, and placed first on the list; and 1863 commanded a squadron in the West Indies, where he captured many blockade-runners. In 1866 he was commissioned rear-admiral on the retired list.

WILKES, JOHN: noted public character, the champion, in his days, of free representative government in Great Britain: 1727, Oct. 17—1797, Dec. 27; b. London. His father, a brewer or distiller at Clerkenwell, sent him to the University of Leyden, where he received an excellent education. On his return to England 1749, he married an heiress, Miss Mead, ten years his senior. His good manners, learning, ready wit, and open table secured him many friends; but extravagance and dissipation soon involved him in difficulties. He and his wife separated, and in a lawsuit which followed, facts came out most damaging to his character. He was nevertheless named high sheriff of Buckinghamshire, and 1757 was returned to parliament as member for Aylesbury. In the house, he joined in the popular clamor against Lord Bute; and 1762, June, founded a paper—the *North Briton*—in which he denounced him with such vigor as to drive him from the ministry. Wilkes attacked with equal bitterness the next ministry, insinuating that though Greville was nominally at the head of affairs, Lord Bute still had the ear of the king. In the 45th number of the *North Briton,* he charged the king with having uttered a falsehood from the throne; and in consequence, Wilkes's house was entered and his papers were seized. He was committed to the Tower, on a general warrant; but was released by Chief-justice Pratt, on account of his privilege as a member of parliament. His paper was burned, by order of the house of commons; but a riot ensued, showing that public sympathy went with Wilkes. Wilkes

next instituted proceedings against the undersecretary of state for the illegal seizure of his papers; and he obtained £1,000 damages—a declaration being at the same time made by the chief-justice that general warrants are illegal. Wilkes then went to France, on the plea of bad health, and was expelled from the house of commons. In his absence, he was convicted of having printed privately an obscene poem, *Essay on Woman*, of which he was one of the authors: it was hoped that evidence of his immoral character would disgust the public with him. But the copy of the book on which the prosecution had been founded had been obtained surreptitiously from a printer employed; and when this fact became known, the steps taken by the government, instead of injuring Wilkes, only added to the outcry against the ministers. On the formation of a new ministry under the Duke of Grafton, Wilkes returned to England and, becoming a candidate for Middlesex, harangued great crowds in London. After his election, he was arrested, in consequence of his outlawry; but on the way to prison was rescued by a mob: after the mob had dispersed, however, he voluntarily gave himself up to justice. When parliament met, a crowd assembled to convoy him to the house of commons. A riot took place, and the military were ordered to fire on the mob in St. George's Fields; many persons were wounded, and one was killed. The coroner's jury returned a verdict of murder against the magistrate who had given the order to fire; and he was tried for that crime, but acquitted. Wilkes, having secured a copy of a letter from Lord Weymouth to the chairman of the Lambeth Quarter Sessions, in which it was recommended that the military should be employed to suppress disturbances in London, published it with a preface, in which he charged the secretary of state with having planned 'the massacre in St. George's Fields.' The house declared the preface to contain a seditious libel, and Wilkes was again expelled. He was after this re-elected several times as member for Middlesex; but the elections were declared void. Colonel Luttrell, who vacated his seat and opposed him, obtained only 296 votes against 1,143 for Wilkes; but he was declared duly elected, in defiance of a protest from the whole country. This raised a storm of public indignation; Wilkes, still in prison, was now recognized as the champion of public liberty, and became the most popular man in England. In 1769 he obtained a verdict in the court of common pleas against Lord Halifax, the leading secretary of state, with £4,000 damages. He was shortly afterward discharged from prison on giving a bond for good behavior during seven years. In 1774 he was chosen lord mayor of London, and again returned to parliament for Middlesex, which he represented for many years. In 1782 the resolution by which he had been declared incapable of re-election was expunged from the minutes of

the house of commons, as subversive of constitutional rights. The other resolutions relating to Wilkes were at the same time expunged. Two years later he withdrew from the house of commons. He died in Grosvenor Square, London Wilkes was a contemporary of the author of the famous *Letters of Junius*, and 13 of the private notes found in the collection are addressed to him.

WILKES-BARRE, *wĭlks'băr-ĭ:* city, port of entry, and capital of Luzerne co., Penn.; on the Susquehanna river, and on the Central of New Jersey, the Delaware, Lackawanna and Western, the Lehigh Valley, the Pennsylvania, and the Delaware and Hudson Canal Co.'s railroads; 18 m. s.w. of Scranton, 144 m. n.-by-w. of Philadelphia; popularly known as 'the Black Diamond City.' It is in the beautiful valley of the Wyoming, and is underlaid by rich anthracite coal-measures. The principal industry is in connection with coal mining. The anthracite coal mining industry started at Wilkes-Barre, anthracite being first used there for manufacturing and domestic purposes. It is in the seventh anthracite mining district of Pennsylvania. The census of 1900 showed over 400 factories in Wilkes-Barre, with a capital exceeding $10,500,000. The most important industries are the manufacture of silk and lace products, carriages, car axles, wire-rope, tin-ware, cutlery, flour, cigars, cotton goods and malt liquors. There are many foundries and machine shops, including the Lehigh Valley R.R. shops. The city is substantially built; has gas and electric light plants, mountain-water supply, street railways, connecting it with suburban villages, and a double-track railroad-bridge across the river, connecting with Kingston. There are national banks, savings banks, state and private banks, daily, weekly, and monthly periodicals. There are more than 20 public-school buildings, several libraries, and many churches. Among the prominent buildings are the court house (cost $175,000), stone prison (cost $200,000), opera-house (cost $120,000), city hospital (cost $30,000), female seminary, high school, home for friendless children (cost $100,000), Wyoming Athenæum, and the building connected with the driving-park. The quarters of the Wyoming Historical and Genealogical Societies contain a valuable collection of antiquities and geological specimens.—The township was surveyed 1770, and the town laid out 1772 by Major Durkee, who gave it its present name in recognition of the cordial defense of the rights of the American colonists, in the British parliament, by John Wilkes and Isaac Barré. Wilkes-Barre was incorporated as a borough 1806, and chartered as a city 1871. The poem *Gertrude of the Wyoming*, by Thomas Campbell, owed its inspiration to an unusually brutal massacre by the Indians 1778, July 3. The event was commemorated by the erection of a granite monu-

ment over the remains of the victims on the centennial anniversary of the massacre. Pop. (1910) 67,105.

WILKIE, *wĭl'kĭ*, Sir DAVID: Scottish painter: 1785, Nov. 18—1841, June 1; b. Cults, in Fifeshire, of which parish his father was minister. His boyish passion for art was so strong that his father, with reluctance, sent him to the Academy of Edinburgh 1799. Here he greatly distinguished himself; and returning home 1804, he painted his *Pitlessie Fair*, a piece which, though the work of an unknown stripling, brought him the sum of £25. Shortly afterward Wilkie went to London, intending to return to Scotland after a year or two of study; but the great success of his picture, *The Village Politicians*, determined him to settle in the metropolis. Not that he was very greatly benefited pecuniarily, £30 being all that the Earl of Mansfield could with difficulty be induced to pay for the picture; but the originality and humor of the work greatly captivated the public, and at once established the reputation of the painter, who soon had commissions in plenty, at greatly advanced prices. In 1809 the Royal Academy ratified the favorable verdict of the public by electing him an associate; and two years afterward he was advanced to the rank of academician. In 1814, in company with his friend Haydon, he visited Paris, and inspected with great delight the art-treasures at the Louvre. In 1817, while the guest of Sir Walter Scott at Abbotsford, Wilkie painted his well-known picture of the great poet and his family. During these years Wilkie had been engaged on the series of pictures on which mainly his fame rests; pictures familiar by engraving (the *Blind Fiddler, Card Players, Rent Day, Jew's Harp, Village Festival, Blind Man's Buff* [1813], *Distraining for Rent, The Penny Wedding* [1818], *Reading of the Will*, etc.), in which the homely humors of humble life are expressed by a vehicle appropriately simple, and of charming purity and transparency. In this style distinctively his own, his genius is commonly held to have culminated in *The Chelsea Pensioners listening to the News of Waterloo* (1820-1). This work was a commission from the Duke of Wellington, who paid the artist 1,200 guineas ($6,132) for it. In 1822 he visited Edinburgh, during the progress of George IV.; and in the following year was appointed royal limner for Scotland. In 1824-5 he travelled extensively on the continent of Europe for his health. After this tour a marked change appeared in his style: he sought to emulate the depth and richness of coloring of the old masters, and deserting the homely life, which he could treat so exquisitely, chose elevated and even heroic subjects to the height of which he could never rightly raise himself. The florid picture (1830), *George IV. entering Holyrood*, illustrates the unwise change. Wilkie, however, remains memorable; not for the quasi-high art of his later years, but for the

simpler, truer, and, in the proper sense, higher art of his earlier time. He never ceased to be popular, and honors continued to be showered on him. In 1830 he was made painter in ordinary to his majesty; and he was knighted 1836. In 1840, seeking to re-establish his health, he visited Syria, Palestine, and Egypt; but died on his voyage home, off Gibraltar, and his body was committed to the deep.

WILKINS, Mary Eleanor. See Freeman, Mary Eleanor Wilkins.

WILKINSBURG, *wĭl'kĭnz-bėrg:* borough in Allegheny co., Penn.; on the Pennsylvania railroad; 7 m. e. of Pittsburgh. It is in an agricultural and mining region; and has car-works, steel-works, iron-foundry, and flour-mill. There are several churches and a weekly newspaper. The principal business is in connection with coal-mining. It was formerly called McNairville, and Rippeyville, and was given its present name in honor of William Wilkins, secretary of war in 1843-5; it was incorporated as a borough in 1887. It is the seat of a home for aged women (Protestant) and of the United Presbyterian Home for the Aged; and there is a high school, established in 1898. Pop. (1900) 11,886. (1910) 18,924.

WILKINSON, *wĭl'kĭn-son,* Henry Spenser: English author: b. Manchester, England, 1853, May 1. He was educated at Owens College, Manchester, and at Merton College, Oxford, and in 1880 was called to the bar. Becoming convinced in 1874 that Great Britain possessed insufficient means of national defense, he has since devoted much attention to the subject and written extensively concerning it. He was on the staff of the Manchester *Guardian,* 1883-92; and since 1895 has been on the staff of the London *Morning Post.* During the earlier progress of the Boer war (1899-1900) his accurate forecasts of military movements on both sides attracted wide attention. His writings include: *Essays Toward the Improvement of the Volunteer Forces* (1886); *The Brain of an Army* (1890); *The Great Alternative, a Plea for a National Policy* (1894); *The Nation's Awakening* (1896); *British Policy in South Africa* (1899); *War and Policy* (1900); *The Nation's Need, Chapters on Education* (edited, 1903); etc.

WILKINSON, *wĭl'kĭn-son,* James: revolutionary soldier and traitor: 1757-1825, Dec. 28; b. Benedict, Md. After medical studies, he joined the army early in the revolution; was captain in Arnold's Canada expedition; major on Gen. Gates's staff; adjutant-general at the battles of Bemis's Heights and Stillwater; took the credit, belonging to another, of a heroic night-inspection of the enemy's force and position, and by this deceit became brevet brigadier-general; but under the influence of drink, disclosed his part in intrigue to make Gen. Gates commander-in-chief instead of Washington; and, after

the petition to congress by nearly 50 officers to annul his promotion, resigned the appointment. Removing to Kentucky after the war, he intrigued with the Spanish governor of Louisiana for the exclusive trade down the Mississippi, and soon afterward for setting up a rival republic in the west, he to be pensioned by Spain—a scheme that was disclosed and defeated, but which postponed the Louisiana purchase and cost the United States many years of Indian warfare instigated by the Spanish. To keep Wilkinson out of mischief he was again made brigadier-general 1792 in the n.w. Indian wars. In 1805 he became governor of Louisiana, and (as some believe, originating the Burr treason) he turned traitor to treason, revealing Burr's scheme to the government. The proof of his suspected treacheries was not then sufficient; when court-martialled he was acquitted. He wrote *Memoirs of My Own Times* (1816).

WILKINSON, Jemima: American religious visionary: b. Cumberland, R. I., 1753; d. Jerusalem, Yates co., N. Y., 1819, July 1. She was educated as a Quaker and at 20, after a severe attack of fever, she professed that she had been raised from the dead, that her carnal life was ended, and that henceforth her body was reanimated by the spirit and power of Christ. She pretended to work miracles, and, though entirely illiterate, induced many intelligent people to become her followers, her attractive person and extraordinary tact and shrewdness aiding her in maintaining the imposture. In 1786, at a meeting of her disciples, it was resolved to found a colony in Yates co., N. Y., in the present town of Torrey. The next year 25 of her followers went to the new purchase, and prepared the land for wheat. In 1789 two of the number purchased 14,000 acres of land in that vicinity, to which was afterward added the township of Jerusalem. The same year Jemima and a large number of her followers came, and a house was erected for her. She had taken the name of the 'universal friend,' and assumed a costume which belonged about equally to either sex, as she asserted that in her spiritual body there was no sex. She was accompanied by two 'witnesses,' Sarah Richards and Rachel Miller. She exacted from her followers the most complete submission and the most menial services, her influence over them being practically supreme. A farm of 1,000 acres was set apart for her special use, and cultivated freely by her followers. She insisted on the Shaker doctrine of celibacy, and the exercises at her religious meetings resembled those of that sect. She never relinquished her pretensions, but after some years her influence waned, and the latter part of her life was embittered by jealousies and annoyances which she bore with no great fortitude. After her death the sect was entirely broken up.

WILKINSON, Sir John Gardner: English archæol-

ogist: b. Haxendale, Westmoreland, 1797, Oct. 5; d. Llandovery, Caermarthenshire, 1875, Oct. 29. He was educated at Harrow and Oxford, and after leaving Oxford lived in Egypt 1821-33, during his stay making a thorough study of the ancient monuments of that country as well as of the languages and manners of the modern inhabitants. The most important fruit of his labors was a work entitled *Manners and Customs of the Ancient Egyptians Derived from a Comparison of the Painting, Sculpture, and Monuments Still Existing, with the Accounts of Ancient Authors* (1837-41), which still remains a standard authority on all that relates to Egyptian art. His later works about Egypt are of a more popular character. Among them are *Modern Egypt and Thebes* (1833), afterward abridged and published as a *Handbook for Travelers in Modern Egypt* (1847); *A Popular Account of the Ancient Egyptians* (1853); and *The Egyptians under the Pharaohs* (1851), forming a supplement to the previous work. His principal other works are *Dalmatia and Montenegro* (1848); and *Color, and the Necessity of a General Diffusion of Taste Among All Classes* (1858). He was knighted in 1839. The collections made by him were given in part to the British Museum, but a considerable proportion of them was presented to Harrow.

WILKINSON, William Cleaver, a.m., ll.d.: American educator: b. Westford, Vt., 1833, Oct. 19. He was graduated from the University of Rochester in 1857, was ordained in the Baptist ministry in 1859, and in 1859-61 was pastor of the Second Baptist Church, New Haven, Conn. He was professor *ad interim* of modern languages at the University of Rochester in 1863-4, and was engaged in pastoral work at Cincinnati, 1863-6. He was professor of homiletics and pastoral theology at the Rochester Theological Seminary in 1872-81, was engaged in literary work in 1873-92, and has since been professor of poetry and criticism at the University of Chicago. He is counsellor of the Chautauqua Literary and Scientific Circle and has published: *The Dance of Modern Society* (1868); *A Free Lance in the Field of Life and Letters* (1874); *The Baptist Principle* (1881); *Poems* (1883); *Edwin Arnold as Poetizer and Paganizer* (1885); *Classic German Course in English* (1887); *The Epic of Saul* (1891); *The Epic of Paul* (1898); *The Epic of Moses* (1903); *Modern Masters of Pulpit Discourse* (1905).

WILL, n. *wĭl* [Goth. *viljan;* Dan. *ville;* Dut. *willen;* Ger. *wollen;* Icel. *vilja;* L. *velle,* to have will, to be desirous of: Russ. *volja,* will, wish: comp. Gael. *dill,* desire, pleasure]: the power of determining or choosing (but see below); discretion; power; pleasure; inclination; intention; determination; that which is wished or desired; command; direction; disposition; a formal declaration in writing of what a person desires to be done with his real

or personal estate after death; the written document containing such instructions (see WILL, in Law): V. to desire that anything should be done or not be done; to determine; to direct; to choose; to enjoin; to dispose of by *will* or testament; to command; to be inclined or resolved to have. WILL'ING, imp.: ADJ. inclined to anything; not disposed to refuse; ready; voluntary; consenting. WILLED, pp. *wĭld.* WILL'INGLY, ad. *-lĭ,* in a willing manner. WILL'INGNESS, n. *-nĕs,* free choice or consent of the will; readiness of the mind to do or to refrain from doing. WILFUL, a. *wĭl'fûl,* governed by the will without regard to reason; stubborn; obstinate; inflexible; done or suffered by design. WIL'FULLY, ad. *-lĭ,* obstinately; stubbornly; by design; on purpose. WIL'FULNESS, n. *-nĕs,* obstinacy; stubbornness. AT WILL, at pleasure. GOODWILL, favor; kindness. GOODWILL OF A BUSINESS, business connections and other advantages so far as they can be disposed of, assigned by a disposer to his successor, viewed apart from furniture, stock-in-trade, tools, or the like. FREEDOM OF THE WILL, the doctrine of the freedom of the human *will,* as opposed to the doctrine of necessity. ILL-WILL, enmity; malice. TO HAVE ONE'S WILL, to obtain what is desired; to do what one desires.—SYN. of 'willing': pleased; desirous; favorable; complying; chosen; spontaneous.

WILL, v. *wĭl* [the same as WILL 1]: a defective verb used with another verb (i.e., as an auxiliary) to express future time; in the first person, *will* promises or expresses fixed purpose or determination, as, 'I *will* eat;' in the second and third, *will* simply foretells, as, 'thou *wilt* eat,' 'he *will eat.*' WOULD, pt. of will, *wûd:* see SHALL: SHOULD: WOULD.

WILL: in psychology, the term refers in a general way to the active side of mental life, and includes choice, decision, intention, volition, and sometimes wish and desire. The fundamental fact is that, just as all nervous action leads over into movement, so all consciousness is impulsive; it is not simply observant or contemplative, but constantly looks to the making of changes in the situation that is observed. This active tendency is far from being uniform throughout all conscious life; it varies in two directions, in intensity of impulsiveness, and in the degree of consciousness of the changes towards which the tendency sets. The scale of impulsiveness extends from passive acquiescence or aloofness at one extreme to the most resolute self-assertion at the other. The scale of conscious prevision of the change to be made begins at zero in simple reflexes, is low in habitual acts which are almost automatically performed, higher in acts which require attention to insure perfect execution, and highest of all in cases which present alternatives and which call for deliberation and choice. These two lines of variation are largely independent of each other, so that a

man may feel the strongest impulsions to act without having a clear conception of the act to which he is impelled, while in another case he may have a clear idea of the course of action on which he has determined, without feeling any violent impulsion to the act. '*Will*,' which is rather a popular than a scientific term, is characteristically applied to cases in which both impulsiveness and prevision are high in the scale.

Will, in the full sense in which it includes prevision of the end, is impossible without previous experience of the end desired, and in this sense the will is secondary to perception, conception, and intellectual experience in general. On the other hand, impulsiveness seems to be as elemental and primary as anything in mental life, and, indeed, intellectual development depends on impulse; so that, in this sense, we may speak of the primacy of the will. Voluntary action is based on instinctive tendencies, which are developed, modified and organized by experience. At any stage in the individual's development, he possesses a certain stock of instinctive tendencies and of habitual inclinations, which are organized or balanced against each other to a certain degree of completeness. In so far as his reaction to a situation that confronts him is readily determined by these existing tendencies and organization, his act need not be voluntary in the full, popular sense. If his act is not so readily determined, either because the situation, though it must be reacted to, does not clearly evoke any tendency to react, or because it evokes conflicting tendencies, then there arises deliberation or the balancing of tendencies, and the outcome is a voluntary act. The voluntary act is a step toward the formation of a new habit, and thus volition may be said to be on the firing line between organization and untried experience.

The freedom of the will is a problem which has much exercised philosophers. On the one hand, men of science have found it hard to conceive of human action as any less determined by causes than other action; on the other hand, students of ethics have felt that unless a man's choice between good and evil was free, there was no basis for moral conduct, or even for legal responsibility. All that psychology can rightfully say from known facts is that a voluntary act is at least partially determined by instinct, past experience and the present situation; that voluntary action, whether free or not, is at least novel; and that there is a consciousness of freedom, which seems, on analysis, to be in part the feeling of freedom from external compulsion, and in part a recognition of the lack of proportion between the prevision of the end and the impulse to strive for it.

The end to which the will is directed may be a bodily movement or, more often, some effect of such a movement; it may also be some internal or mental result, the

consideration of a certain object, the finding of a forgotten name, the solution of a problem. When the end sought is internal, the name attention is often applied (see ATTENTION). The will may be strong or weak—strong, not always when the impulsiveness or the prescience is strong, but when the decision, once taken, is not easily altered. The will may be prompt or impeded—impeded when internal difficulty is experienced in passing from the preliminary stages of desire and deliberation to the final decision and execution. Willing may or may not be attended by a feeling of effort; it is so attended when the will is haltingly directed to the overcoming of some impulse, and the feeling of effort seems to consist largely of sensations of muscular strain induced by the conflict of the two tendencies.

In certain nervous diseases, as hysteria and psychasthenia, the will is disordered in characteristic ways. There may be *impulsions* or 'imperative ideas,' which can not be shaken off, though distasteful to the individual; and there may be *abulias*, consisting in the inability to do, or actually to will, what one means to do.

WILL, or TESTAMENT, in Law: a writing by which a person entitled to property declares what is to be done with such property after his death. Will is a general term, and covers the disposition of both real and personal property; while *testament* is properly applied to personal estate only; but the distinction is seldom observed, and the common designation 'last will and testament' is the phrase used whether real or personal estate is to be disposed of, or both. The term *will* includes codicils. A writing is indispensable to a will, except in the case of soldiers or sailors who, because of their occupation, and while in actual service, are allowed to make a verbal or nuncupative will; but this exception extends only to their personal estate, and they must make a written will, like other persons, in order to deal with their real estate. All nuncupative wills must be made in the immediate prospect of death.—In England and Ireland, an infant, or person under 21 years of age, cannot make a will. A married woman can make a will only when she has separate property, or when her husband assents to her will, or when she makes the will by virtue of some power of appointment vested in her. As a general rule, it is absolutely necessary that the party making a will should have a free and disposing mind at the time; hence, if he or she be an idiot, or a lunatic, or drunk, or acting under compulsion, fear, or undue influence, the will is invalid. There is no limit as to the time preceding death when a will may be made; it is enough that the testator was at the time capable and sensible, though he died immediately afterward. In general a will must be executed in presence of two or more witnesses, who see the testator sign the will, or at least hear him acknowledge it. But there

is no particular form of words in which a will must be made for the purpose of disposing of either realty or personalty. The will must be in writing, but not necessarily in ink or written continuously. The testator may sign by his mark or by an assumed name. Though a seal is not equivalent to signature, yet a person may have a stamp to sign papers with, and that will be sufficient for a will also. The testator need not sign the will if he authorize some one to do so for him in his presence. The signature must be at the foot or end of the will; but if it is placed so as to lead a court to the conclusion that it was intended to give effect to the will, that will be enough. Though the witnesses need not know it is a will, they must be present together when the testator signs it or acknowledges his signature. The witnesses must sign their names or make their marks. A legatee, or the wife or husband of a legatee, may be an attesting witness, but by being so, he or she will forfeit any legacy left to him or her by the will. But one may be an executor though he attests the will. A will is revoked by the marriage of the testator or testatrix. The mere fact of making a subsequent will does not of itself operate to revoke a prior will, unless there is some inconsistency in whole or in part, and, as a general rule, no will will be revoked by any presumption of an intention on the ground of an alteration in circumstances. The usual way of revoking a will is to burn, tear, or destroy it with the intention of revoking the same; or by executing another will which expressly revokes the prior will. When a testator tears or cuts away that portion of his will containing the signature and attestations, the presumption is that he intended to revoke the whole. But merely cutting out a part of the will, or striking it through with a pen, does not amount to a revocation. It is to be borne in mind that, in order to revoke by tearing, etc., there must be an intention to revoke, so that a mere accidental tearing will prevent the act from having the force of revocation. When there are interlineations or alterations in a will, it is presumed these are made after signature, unless there is evidence to prove the contrary. A will which is in any manner revoked can be revived only by re-execution, or by a codicil showing an intention to revive it; but many nice questions have arisen as to what causes a will to revive. See EXECUTOR; LEGACY; PROBATE; etc.—In Scotland a will is used only to denote a testament affecting personal or movable property; while a will affecting real or heritable property can be made only by way of a deed having a present operation. A will or testament may be written in the handwriting of the testator, and if signed by him, will not require witnesses, being then called a holograph will. In other respects, wills are subject to nearly the same rules which prevail in England with respect to revocation, etc. Wills of real property are called Dispositions or Deeds, and have a present

operation, and the mode in which they are drawn up is that of conveying the property to the disponee, but reserving the testator's liferent. The effect of this is that the testator retains the property in his own hands while he lives; but at the moment of his death, the disposition *mortis causa* comes into play, and the disponee then takes the property, subject to the deed: see DEED.

In the United States the law relating to wills corresponds in the main with that of England and Ireland. Several modifications, however, have been introduced by statute in some of the states. In most, the age of testamentary capacity is 21 years or 'full age.' In California, Connecticut, and Nevada, it is 18; in Colorado, Illinois, Maryland, and District of Columbia, 21 for men, and 18 for women; in New Mexico, 14 for men and 12 for women. In Arkansas, Missouri, Oregon, and Virginia, 21 is the usual age; but personalty may be disposed of at 18, and in Colorado at 17 if the person be 'of sound mind and memory.' As in England, only personal property can be disposed of by nuncupative will; but the amount varies in different states, from $100 in New Hampshire to $200 in North Carolina, $250 in Tennessee, $300 in Iowa and Michigan, $500 in Alabama and Arkansas, and $1,000 in California and Nevada. Usually two witnesses are required, but in some three, as in Florida and New Hampshire, and in New Mexico 5. The will itself must be reduced to writing very shortly after being uttered, the period allowed for this varying from 6 days in Florida, New Hampshire and Texas, to 10 days in North Carolina, Ohio and Tennessee; 30 days in California, and 60 days in most other states; and it must, as a rule, be probated within 6 months—in some states, as in Nevada, in 3.—The Homestead Law (q.v.) in some states affect the validity of a will, by making void a husband's devise of homestead land, and in some states only a portion of the disposable property can be willed away so that children cannot be disinherited without good cause; and in some jurisdictions, Ohio, Pennsylvania, etc., bequests for any benevolent, religious, educational, or charitable purpose, as against children and their legal representatives, are void unless the will be executed a certain specified time before the death of the testator—in Ohio one year, in Pennsylvania one month. Married women cannot impair the husband's right as a tenant by the courtesy, as in Oregon and Rhode Island; and in certain other states, as in Colorado, they may not leave more than half their property away from their husbands. In some states, as in Delaware, women must have the written consent of their husbands, given under hand and seal in the presence of two witnesses, to dispose by will of their property, whether real or personal. In Louisiana the law—mainly according to the French system—is peculiar and elaborate: there are four kinds of wills: (1) *Nuncupative*

wills by public act, in which the testament is dictated to a notary and by him written down in the presence of three witnesses, read by the notary to the testator in presence of the witnesses, and signed by the testator and at least one witness. It is essential in this form of will that all the formalities be fulfilled at one time without interruption or turning aside to other acts. (2) *Nuncupative wills by private act,* in which the will is written by the testator himself in presence of 5 witnesses, read to them by the testator or by one of the witnesses, and signed by the testator and at least two of the witnesses. (3) *Mystic or sealed wills,* in which the document purporting to be the disposition of the property is placed in a paper or envelope which must be closed and sealed. Thus closed and sealed it is presented by the testator to a notary and seven witnesses, declaring in their presence and hearing that it contains his last will and testament written by himself (or by another) and signed by him. The notary then draws up the act of superscription which is written on the closed envelope or paper, and signed by the testator, the notary, and the witnesses, or at least two of them. It is essential that all this be done continuously without interruption or break of any kind. (4) *Holographic wills,* which to be valid must be written, dated, and signed entirely by the hand of the testator. By the existing laws of the state of Louisiana no one can dispose of his whole estate if he have children.

In the Dominion of Canada, the law in regard to wills is partly French and partly English. In the province of Quebec, wills are of three kinds: (1) *The Authentic or French will,* made before two notaries or a notary and two witnesses (males only); (2) *The English will,* made in the presence of two witnesses (male or female); (3) *Holographic wills,* which must be written and signed entirely by the testator, but which require neither notaries nor witnesses.

WILLAMETTE, *wĭl-â'mĕt,* River: river of Oregon, branch of the Columbia. It rises in three small streams in the Cascade Mts., which streams unite at Eugene City, and flow thence n.w. and n., and empty into the Columbia about 12 m. below Portland; length nearly 300 m. It receives throughout its course a number of tributaries from the e. and w. Willamette Falls, at Oregon City, 25 m. from its mouth, formerly obstructed navigation, but a canal with locks has been constructed at a cost of about $500,000, and the river is now navigable for light vessels in summer to Eugene City, about 126 m. It is navigable for ocean steamers to a few m. above Portland.

WILLARD, *wĭl'ẽrd,* Emma C. (Hart): educator and author: 1787, Feb. 23—1870, Apr. 15; b. Berlin, Conn.; daughter of Samuel Hart, descendant of the Rev. Thomas Hooker, first minister of Hartford. While pre-

ceptress of Middlebury Acad., Vt., she married Dr. John Willard; and there in 1814 established a girls seminary, with innovations on the prevailing system, which she set forth in an address, *A Plan for Improving Female Education,* 1819. This she submitted to Gov. Clinton of N. Y.; and, with aid from the state acad. fund, she opened a school in Waterford, N. Y., the same year, but removed it to Troy 1821, that town having erected a building for the enterprise. It became the famous Troy Female Seminary, continued by her son after her retirement 1830. She devoted the profits of one of her books to a normal school for women in Greece. She travelled extensively in this country, lecturing on education, to which, especially for women, she gave great impulse, so that she is regarded as the pioneer in its modern stage of development.—Besides her well-known textbooks in history, geography, etc., she published a vol. of foreign travel; a treatise on blood-circulation, another on respiration; *Morals for the Young* (1857); and poems. She died in Troy. Her life was written by John Lord, LL.D., 1873.

WIL'LARD, FRANCES E.: educator and philanthropist: b. Churchville, N. Y., 1839, Sep. 28; d. 1898, Feb. 17. She graduated at the Northwestern Female College, Evanston, Ill., 1859; became prof. of nat. science there 1862; was principal of Genesee Wesleyan Seminary 1866-7; travelled abroad, studying in Paris, and writing for periodicals, 1869-71; and 1871 became professor of æsthetics in Northwestern University, Evanston, and dean of the Woman's College. In this position she distinguished herself by developing original views of self-government by students, which have been widely accepted among educators. From 1874 Miss Willard retired from college work to devote herself wholly to the work of the Woman's Christian Temperance Union, to whose development and influence her character and ability have remarkably contributed. She held the position of corresponding sec. until 1879, and organized the home-protection movement; and since 1879, as pres., she has wisely and ably directed the activities of the organization. At the death of her brother, Oliver, she took his place as editor of the *Evening Post,* Chicago. From 1882 she undertook political work as a member of the executive committee of the prohibition party. In 1886 she became the recognized head of the White Cross movement within the temperance unions of women, and was successful in securing in many states special enactments for protection of women. In 1883 she founded the World's Christian Temperance Union, and 1888 became its president, and president also of the American branch of the International Council of Women. Among the published writings of Miss Willard are: *Nineteen Beautiful Years* (New York 1863 and 77); *Hints and Helps for Woman's Christian Temperance Work* (New York,

12mo); *Woman and Temperance; or, the Work and the Workers of the W. C. T. Union* (Hartford 1883); *How to Win; a Book for Girls* (New York 1886); *Woman in the Pulpit* (Boston 1888); *A Great Mother* (1893); and many pamphlets and articles in magazines.

WILLARD, Josiah Flynt: American author and sociologist: b. Appleton, Wis., 1869, Jan. 23; d. Chicago, 1907, Jan. 20. While studying at the University of Berlin in 1890-5 he became deeply interested in sociological problems, and was particularly impressed with the danger impending to the United States through its being looked upon by the criminal class of Europe as a haven of refuge when their own country would no longer suffer their being at liberty. In order thoroughly to understand the situation and the actual conditions and feelings governing the tramp world he led for several years the life of a vagrant, publishing the results of his observations in *Tramping with Tramps* (1899). His other writings include: *Powers that Prey,* with F. Walton (1900); *Notes of an Itinerant Policeman* (1900); *The World of Graft* (1901); *The Little Brother* (1902); *The Rise of Ruderick Clowd* (1903); etc.

WIL'LARD, Samuel: Congregational minister: 1640, Jan. 31—1707, Sep. 12; b. Concord, Mass.; son of Simon Willard (q.v.). He graduated at Harvard 1659; studied theology; was pastor at Groton 1663-76; at the Old South Church, Boston, 1678-1707; and vice-president (acting president) of Harvard 1701 till his death. He boldly opposed the persecutions during the 'witchcraft delusion' 1692. Besides numerous sermons and treatises, he published: *Ne Sutor ultra Crepidam, or Brief Animadversions upon the New England Anabaptists' Late Fallacious Narrative* (1681); *Mourner's Cordiall against Excessive Sorrow* (1691); *Peril of the Times Displayed;* and he left MSS. which were published as *A Compleat Body of Divinity in Two Hundred and Fifty Lectures on the Assembly's Shorter Catechism* (Boston 1726), said to be the first miscellaneous folio volume published in this country.

WIL'LARD, Simon: 1605, Apr.—1676, Apr. 24; b. Horsemonden, England. He came to New England 1634, and was one of the founders of Concord, Mass. He was clerk of Concord 1635-53; representative in the legislature 1636-54; councilor 1654-76; and was a maj. of militia in King Philip's war. Later he became a magistrate in Salem.

WILLARD SCHOOL, The Emma: it is one of the oldest institutions for the higher education of women in the United States. It is the outgrowth of an institution founded by Mrs. Emma Willard in Middlebury, Va., in 1814.

In 1819, the patrons of Waterford, N. Y., urged removal of the school to that place, believing the richer

state of New York would grant it an appropriation. The legislature did not grant an endowment, but the application led to the allowing of a portion of the literature fund for girls' schools to be given to the school, the first legislative appropriation of money for the education of girls.

In 1821, Mrs. Willard accepted an invitation from the citizens of Troy to remove the seminary to that city, where the school became known as the Troy Female Seminary. From the establishment of the seminary in Troy in 1821, to 1875, more than 15,000 pupils were connected with the school. In 1892, a complete reorganization of the course of study was made, the art department was introduced, the boarding department was opened in Russell Sage Hall, and the old name gave way to that of Emma Willard School, thus bringing the school into close touch with its famous past and associating it in name with its illustrious founder.

The school now occupies, in addition to the former residence of Mrs. Emma Willard, three new beautiful buildings erected for its use.

Russell Sage Hall, the gift of Russell Sage, whose wife was for years the efficient president of the Emma Willard Association, is the residence for members of the faculty and for boarding pupils. The building consists of five stories above the basement. It is fire-proof in construction, all floors having steel beams with a filling of fire-proof material, and all dividing walls and partitions being of brick or hollow tiles.

The Gurley Memorial Hall contains the assembly room, recitation rooms, gymnasium, laboratories, library, and offices. It is a two-story basement structure, having a central section and two wings, built of granite with Long Meadow brown-stone trimmings, and has a handsome appearance from every point of view. This building is also fire-proof, all of the floors are laid upon brick, supported by iron beams, and the plastering and ceiling are applied directly to the brick without lath. The rooms are spacious, with high ceilings, are well lighted and are handsomely furnished.

The library contains over 2,000 volumes, and is open daily for the use of faculty and students.

WILL'COX, Orlando Bolivar: soldier: b. Detroit, Mich., 1823, Apr. 16; d. Coburg, Ontario, May 10. He graduated at West Point 1847, and was assigned to the 4th artillery; served in the last part of the Mexican war, on frontier duty, and against the Seminoles. He resigned his commission 1857, Sep. 10, studied law, and practiced at Detroit until the civil war. 1861, May 1, he was made col. of the 1st Mich. regt.; and commanded a brigade at Bull Run, where he was wounded and taken prisoner; 1862, Aug. 17, exchanged and commissioned brig.gen. of vols. to date from 1861, July 21; served in the Maryland and Rappahannock campaigns;

commanded the districts of Ind. and Mich. during the draft riots; commanded a division in the 9th corps of the Army of the Potomac in the Richmond campaign; 1866, Jan. 15, was mustered out of service, and returned to his law practice. 1866, July 28, he was recommissioned in the regular army as col. of the 29th infantry; 1867, Mar. 2, brevetted brig.gen. for Spottsylvania and maj.gen. for Petersburg; 1886, Oct. 13, became brig.-gen.; 1887, Apr. 16, was retired from the service.

WILLEMS, *wĭl'lĕms,* Jan Franz: Flemish philologist and writer, noted as one of the originators of the Flemish national movement (see Flemish Language and Literature): 1793-1846; b. Bouchout, near Antwerp. Willems, at the age of 12, was sent to the town of Lierre, to learn music. There he attracted attention by his acting and his satirical verse-making in connection with some ancient literary societies; and some persons at Lierre sent him to Antwerp, to study in the office of a notary. In 1811 he contended successfully for the prize awarded for the best poem on the battle of Friedland and the peace of Tilsit. From this period his poetical and dramatic compositions followed in rapid succession. His ode (1818) *Aen de Belgen* (To the Belgians), in which he exhorted his countrymen to resume the use of their native Flemish; and his clever treatise on *De Nederduytsche Tael en Letterkunde* (1819-24), in which he traced the history of the Flemish and Dutch tongues, mark an epoch in the literary history of Belgium. The Dutch government showed their approval of his anti-French tendencies by giving him an official appointment; but the Roman Catholic party in Belgium, resenting his attempt to refer the decline of Belgian national renown to the abandonment of the Flemish vernacular, regarded him with mistrust; and when Belgium was definitely separated from Holland 1830, the dominant Belgian party deprived Willems of his office. In 1835 he was appointed keeper of the archives at Ghent, where he resided in honor till his death. Among his many Flemish works was a version of the mediæval poem *Reineke Vos,* or *Reynard the Fox,* for which he claimed a Flemish origin.

WILLEMSTAD, *wĭl'lĕm-stâd:* fortified town of the Netherlands, province of North Brabant; on the Hollandsdiep: 19 m. n.w. of Breda. Willemstad was erected by William I., Prince of Orange, to protect the traffic between Holland and Zeeland. There are 7 bastions, 2 forts, 2 inundation sluices, and a good haven. In 1793 Baron van Boetzelaar successfully defended Willemstad against the French, under Dumonriez, who, after a heavy bombardment, were forced to raise the siege. It was the birthplace of the naval hero Callenberg, who, when De Ruyter fell in action with the French, succeeded to the command.—Pop. (1901) 2,133.

WIL'LEMSTAD: chief town of the island of Curaçoa (q.v.).

WILLET, *wĭl'lĕt* (*Symphemia semipalmata*): bird of family *Scolopacidæ;* native of both N. and S. America. The name is derived from its note. It is about 15 in. long; brownish gray varied with dusky; rump, upper tail-coverts, and under parts white; tail grayish; tail-feathers, all except the two middle feathers, spotted or barred with dark-grayish brown; secondaries of the wings white, with dark-brown spots. The bill is a little more than 2 in. long, very thick, compressed; wings long; bluish legs long and strong; tail short and nearly square; toes partially webbed.

WILLET, *wĭl'lĕt*, THOMAS: merchant: 1611-1674, Aug. 4; b. England. In 1630 he came to this country from Leyden with Isaac Allerton, and engaged in trade in the Plymouth colony; removed to New Netherlands at the time of its capture from the Dutch; 1650 was commissioner for the New Netherlands to settle boundary questions with New England; 1665, June 12, appointed by Gov. Richard Nicolls first mayor of New York; and Aug. 23 of the same year nominated commissioner of admiralty. When the Dutch retook the colony of New York or New Netherlands, Willet's property was confiscated, and he returned to New England.

WIL'LETT, MARINUS: soldier: 1740, July 31—1830, Aug. 22; b. Jamaica, L. I. He was a lieut. in Delancey's regt. in the French war; distingushed himself in the attack of Fort Ticonderoga 1758; was in Bradstreet's expedition against Fort Frontenac; one of the leaders of the Sons of Liberty in New York; 2d capt. in McDougall's regt. 1775; served in the Canada campaign 1775-6, remaining for some time in command of the port of St. John after its capture; 1776 became lieut.-col. of the 3d N. Y. regt.; 1777, Aug. 2, second in command at Fort Stanwix (or Schuyler), where he led a successful sally against St. Leger's regulars, Johnson's royal greens, and the Mohawks under Brant, afterward holding the fort until its relief by Arnold; 1778, June, joined the army in N. J., and 1779 accompanied Gen. Sullivan in his expedition against the Six Nations. He was sheriff of New York 1784-92, and 1807 appointed mayor of New York. In that city he died.

WIL'LETS POINT, N. Y.: rational military reservation on the s. shore of East river at its entrance to Long Island Sound. The reservation comprises 136 acres, purchased partially in 1857 and partially in 1863; the construction of a fort was begun here in 1862, but the work was suspended and the fort remains unfinished. After the war, an engineer battalion was ordered here to establish a depot for stores, a station for torpedo experiments, and a school of practice. The post is also known as Fort Totten.

WILLIAM, *wil'yam*, I., King of England, commonly called WILLIAM THE CONQUEROR: 1027 (or 8)—1087, Sep. 9 (reigned 1066-87); illegitimate son of Robert, surnamed *Le Diable*, Duke of Normandy (see NORMANS). He succeeded to the dukedom on the death of his father 1035. Previous to his father's death, he had been intrusted to the care of Henry I. of France; but it was due rather to the quarrels and jealousies of his own subjects, than to the protection of Henry, that his dominion was preserved intact until his arrival at manhood. In 1047 he gained a victory at Val de Dunes over a powerful competitor, Guido of Macon; and 1054 he defeated another rival, Guillaume, Count of Arques—being aided in both contests by the French. His ambition now began to extend to England, where Edward the Confessor reigned. Visiting England, W.'s hopes of succeeding Edward were strengthened by the dominance of Norman influence in the councils of that monarch. On Edward's death, however, the Witenagemot (q.v.) chose Harold (q.v.) to the English throne; ignoring, according to the monkish chroniclers of Norman bias, an alleged bequest of Edward in favor of William. The Norman asserted his claim by a powerful invasion; and the result was his acquisition of the crown by the famous battle of Hastings, 1066, Oct. 14. Harold having been killed in the fight, the Saxons chose Edgar Atheling as his successor. Edgar was, however, soon compelled to yield, and W. was crowned king of England 1066, Dec. 25. W.'s treatment of the conquered people was at first conciliatory; but his savage suppression of a rebellion, which broke out in the north 1070, laid the foundation of an irreconcilable antipathy between Saxon and Norman, which rendered a continuance of the mild policy impossible; and before long, W. began to rule like a true conqueror. Everywhere the Saxons were reduced almost to slavery. The higher classes were deprived of every office in church and state, while the people were ground down by new and oppressive taxes. Fortresses were erected over the country, and garrisoned, to overawe the Saxon inhabitants. In 1072 the Saxons were so far reduced to submission that W. found time to lead an army across the border into Scotland, to punish the king of that country, Malcolm Canmore, for having received and protected Edgar Atheling. The conqueror marched as far n. as the Tay, and received a nominal submission from Malcolm. In 1085 an attempt was made to overturn the power of the English king by Canute, King of Denmark. A great naval armament was assembled for the invasion; but the enterprise was abandoned, partly by reason of various mishaps, and partly, it is supposed, by reason of a skillful application of W.'s treasure. The tax called the *Danegelt* (q.v.) was reimposed to meet the expense caused by the threatened war. Disputes having arisen between W. and his son Robert respecting the duchy of Maine—which had come to W. through his marriage (1053, Nov. 2) with Mathilda, daughter of Baldwin, 5th Earl of Flanders—father and son took

up arms against each other. The dispute was ultimately adjusted, through the intercession of Queen Matilda. Most of the latter part of W.'s life was spent in Normandy, the government of England being intrusted mainly to his half-brother Odo, Bp. of Bayeux. Insurrections, which broke out in his dominions on both sides of the Channel, were put down with prompt and sometimes merciless strokes of military force.—A disputed claim to the dist. of Vexin, on the e. frontier of Normandy, caused him to raise an army and invade France. He took the city of Mantes, and set it on fire; but his horse, stumbling on some hot embers, threw him, and the injury that he received proved fatal. Stern and ruthless as W. undoubtedly was, he yet knew how to govern a nation and protect it from foreign aggressions. For more than two centuries England had been harassed by the frequent descents of piratical hordes. This self-reliant ruler put an end to these: never after W.'s time did a Norse rover venture to show face on the English coast. He was as much statesman as warrior. He shrewdly centralized the governmental power (see DOMESDAY), holding in check the feudal barons; and diplomatically balancing his Norman and his Saxon subjects so that they acted as countervailing elements in his realm. In the common administration of justice, he was royally impartial; many of his severities are even referable in part to his thorough hatred of anarchy, while his attitude toward the church is admirable. He clearly defined the limits of ecclesiastical judicature, and when the formidable Pope Hildebrand desired that the conqueror should do homage to him for the kingdom of England, he boldly refused. He was an upholder of the Roman authority in the church, but would not brook its interference in his political sovereignty: he kept in his own hands the appointments to ecclesiastical dignities, and he would not allow papal excommunications to take effect in his kingdom without his leave.

WILLIAM II. (surnamed RUFUS), King of England: 1056–1100, Aug. 2 (reigned 1087–1100); b. Normandy: third son of William the Conqueror. He was educated by the celebrated Lanfranc, Abp. of Canterbury. He was the favorite son of his father, who, on his deathbed, recommended him to the barons and prelates as his successor to the crown of England. W., then with his father in Normandy, immediately set out for England. Landing at Dover, he obtained possession of its castle and of several other fortresses. He then presented himself to Lanfranc, who proposed him to the nobles and prelates as their king. No opposition was offered: and W. was crowned 1087, Sep. 26 Meanwhile, his elder brother, Robert, had entered on possession of the duchy of Normandy. The relative position of the brothers was such as, in those times, was sure to lead to war. Robert, at the instigation of his uncle Odo, Bp. of Bayeux, endeavored to excite an insurrection in England: the attempt failed, and W., in retaliation, invaded Normandy 1091, Jan. An arrangement having been ultimately made through the mediation of Philip I. of

France, Robert and W. then turned their united arms against their third brother, Henry, who had purchased from Robert the district of Cotentin, comprising nearly one-third of Normandy. The fortune of war went against Henry, who was driven into exile. Returning to England, W.'s next enterprise was an invasion of Scotland The life of W. seems to have been a continual strife. Returning from Scotland, he saw cause to renew the contest with his brother, who had, meanwhile, strengthened himself by alliance with Philip of France. A pecuniary payment, however, by W. to Philip soon dissolved the bond. W. would now, doubtless, have taken signal vengeance on his brother, had he not been recalled to England by disturbances in Wales and in the north. In 1096 Robert, having resolved to go on crusade to Palestine, sold his duchy of Normandy to W., for £10,000. This transaction led to a contest between W. and a chieftain named Helie de la Flêche, who had all along disputed Robert's right to the Maine district of Normandy. Helie, unable to withstand the English monarch, who now took the field against him, disbanded his forces and fled. The last three years of William Rufus were occupied with these tedious conflicts in France. He was shot (it is said, accidentally, though there appears equal reason to believe the act intentional) by an arrow, supposed to have come from the bow of Sir Walter Tyrrel, while hunting in the New Forest. His body was buried in Winchester Cathedral. W. inherited the courage, energy, and political talent of his father; but he exercised an unscrupulous tyranny; as was shown in his expulsion of Anselm (q.v.), who had succeeded Lanfranc as abp. of Canterbury. See Freeman's *Reign of William Rufus* (2 vols. Oxford 1882).

WILLIAM III., King of England, and Prince of Orange: 1650, Nov. 14–1702, Mar. 8 (reigned 1689–1702); posthumous son of William II. of Orange, and Mary, eldest daughter of Charles I. of England The alliance of his family with the Stuarts excited the suspicion of Oliver Cromwell, by whose influence the young prince and his descendants were declared to be excluded from the stadtholdership of the United Netherlands. W. 'found himself,' says Macaulay, 'when first his mind began to open, the chief of a great but depressed and disheartened party, and the heir to vast and indefinite pretensions, which excited the dread and aversion of the oligarchy, then supreme in the United Provinces.' The restoration of the Stuarts in England greatly improved his prospects; and on the murder of De Witt, W., then in his 22d year, was chosen stadtholder. The republic was at this time carrying on an apparently hopeless war with its powerful neighbor, Louis XIV. of France; but by the wisdom and determination of the young stadtholder, the contest, after nearly seven years, was terminated 1678 by the treaty of Nimeguen, in a manner highly advantageous and honorable for the United Provinces. A few years before, their ruin had seemed inevitable; but now the fame of W. became great over Europe. Shortly before this event, he

had married his cousin, Princess Mary, eldest daughter of the Duke of York, afterward James II. of England. This marriage, entered into solely from political considerations, did not at first prove happy. W. seems to have been doubtful of his wife's position, and too reserved to give utterance to his feelings. According to Macaulay, a complete explanation and reconciliation were ultimately procured by the agency of Bp. Burnet.

In 1686 W., as Prince of Orange, became the head of a league formed among the Prot. princes of Germany, the kings of Spain, Sweden, and others, having for its object to curb the power of Louis XIV. The treaty by which the alliance was constituted was signed at Augsburg 1686, July. In England, the tyranny of James II. (father of W.'s wife) was beginning to estrange from him the affections of every class of his subjects; and the eyes of all were turning toward the stadtholder as their only hope—he being the heir presumptive to the Eng. throne. Having formed his resolution, W. conducted his operations with great secrecy and skill. 1688, Nov. 5, he landed at Torbay, with 15,000 English and Dutch troops. His success was rapid and bloodless. Men of influence of all parties gave him their presence and support; and Dec. 18 he entered London triumphantly as a national deliverer. According to the decision of a convention of representative men of the kingdom, summoned by W., in London, William and Mary were proclaimed king and queen, 1689, Feb. 13. The adherents of James held out for some time in Scotland and Ireland; but the death of Dundee ended their resistance in Scotland; and in Ireland it was ended 1691, after a vigorous contest of two years, in which the Stuart party had, in most cases, the advantage.

The object of W., in accepting the crown of England, was probably not so much to free the English nation from the tyranny of James, as to enlist its power on his side against that of France. The first year of his reign was occupied in forming the coalition against Louis XIV. known as the Grand Alliance. In spite of his sterling qualities, and of the debt which they owed him, the English nation never really liked William III. The death of his wife (1695), on whom the crown had been conferred jointly with himself, materially injured his position. His schemes were thwarted by parliament, in which the whigs and tories quarrelled violently in spite of all his efforts to conciliate both parties; continual plots for his assassination were hatched by the adherents of James; and in his warfare with France, victory was almost always on the side of Louis, W. being in person repeatedly defeated by Luxembourg (q.v.); and it was not without a struggle and a pang that he agreed to the terms of the peace, eminently popular, however, which was concluded at Ryswick 1697, Sep. 10. The death of Charles II. of Spain 1700, and the succession of Philip of Anjou, was another blow to his policy. He carried it on, however, with unflagging vigor till his death, which was occasioned by a fall from his horse 1702. The massacre of the Mac

donalds of Glencoe (q.v.), and his conduct relative to the promoters of the Darien Scheme (q.v.), are two blots on W.'s reputation which his most thoroughgoing apologists have been unable to efface. However, he was undoubtedly a practical genius of the highest order, and the services which he rendered both to England and to his native country can hardly be overrated. During his reign the Bank of England had been founded, the modern system of finance introduced, ministerial responsibility recognized, the liberty of the press secured, and the British constitution established on a firm basis. In his domestic life, he committed the error of a too stern repression of all manifestation of kindly or genial feeling. His manner was wholly Dutch, and even his countrymen thought him blunt. 'In his intercourse with the world in general,' says Lord Macaulay, 'he appeared ignorant or negligent of those arts which double the value of a favor and take away the sting of a refusal.'—See Macaulay's *History of England.*

WILLIAM IV., King of Great Britain and Ireland: 1765, Aug. 21—1837, June 20 (reigned 1830–37); b. Windsor; third son of George III. Until 1771 he remained, with the Prince of Wales and Prince Frederick, under the care of Dr. Majendie. He was then sent to Kew, where, with Prince Edward, afterward Duke of Kent, he was under the guardianship of Col. Bude. 1779, June 15, he entered the navy as midshipman on the *Prince George,* under Rear-admiral Digby. The *Prince George* then joined Admiral Rodney's squadron, on its way to Gibraltar. After seeing considerable service, Prince W. was made a lieut. 1785, and received his commission as capt. the next year. In 1789 he was created Duke of Clarence and St. Andrews, and Earl of Munster, with an allowance from parliament of £12,000 a year. Subsequent to this, several acts of insubordination on his part rendered an actual continuance of his professional career impossible: he was, however, formally promoted through the successive ranks until he was made admiral of the fleet 1801. Meanwhile he had been living almost entirely ashore, with Mrs. Jordan, a famous actress, with whom he had become connected 1791: by her he had a family of five sons and five daughters, who became known by the surname Fitzclarence, and were raised to titular dignities. 1818, July 11, he married Adelaide, eldest daughter of the Duke of Saxe-Meiningen. The issue of this marriage was two daughters, both of whom died in infancy. By the death of the Duke of York 1827, the Duke of Clarence became heir-presumptive to the throne; to which he succeeded on the death of his brother, George IV., 1830, June 28.

In the earlier part of his reign he showed mildly 'liberal' tendencies, which in his last years disappeared. He was of a well-meaning but somewhat irresolute disposition. The great event of his reign was the passing of the Reform Bill (see REFORM, BRITISH PARLIAMENTARY). The first Reformed parliament met 1833, Jan. 29. The abolition of colonial slavery, the reform of the poor-laws and of the

Irish Church, were the immediate results of the great constitutional change W. IV. dying, after a short illness, 1837, was succeeded by his niece Queen Victoria.—See his Life by Percy Fitzgerald (2 vols. 1884).

WILLIAM THE LYON, King of Scotland: reigned 1165-1214; d. 1214. He succeeded his brother, Malcolm IV. Why he obtained the title Lion is one of the mysteries of history: perhaps from having been the first king who used the lion as a heraldic achievement, afterward the chief feature in the arms of Scotland. Desiring the possession of the Northumbrian districts, and invading them, after the example of his ancestors, he fell into the hands of an English party 1174, July 13; and for security was conveyed to Normandy, and there he consented, as the price of his liberation, to perform that homage for his kingdom which the English kings had long in vain attempted to exact from the rulers of Scotland. The treaty of Falaise, however, as the transaction was termed, from the place where it was adjusted, was revoked 1189 by Richard I. of England, in consideration of a payment of 10.000 marks, which he wanted for his celebrated expedition to Palestine. W. had several disputes with the church; but he was one of the early benefactors of the regular ecclesiastics, and founded, 1178, the great abbey of Arbroath, which he dedicated to Thomas à Becket, who had been slain eight years earlier.—W.'s alliance with Louis VII. of France is the earliest authentic connection between the two countries—the first touch of a contact which lasted even to the 18th century.

WILLIAM I. (WILHELM FRIEDRICH LUDWIG), German Emperor and King of Prussia: 1797, Mar 22—1888, Mar. 9 (regent of Prussia 1858–61, king 1861–88, emperor 1871–88); b. Berlin; second son of Frederick-William III. of Prussia, and of Princess Louisa of Mecklenburg-Strelitz. He joined the army at an early age, and was engaged in the campaigns of 1813–4 against France. On the accession of his elder brother, Frederick-William IV. (q.v.), to the throne in 1840, W. became gov. of Pomerania, and afterward sat in the Prussian diet, and vigorously supported the absolutist party. In consequence, he was so much disliked by the people that in the revolution of 1848 he retired to England: though he returned some months afterward, and was elected to the national assembly. However, from this time he interfered little in the quarrels between the constitutionalists and absolutists, though he gladly accepted the command of the troops dispatched to put down the rising in Baden 1849; and in 1857 W.'s brother, the king, having become incapacitated for business, W. was commissioned to act as regent—a commission renewed from time to time till his permanent installation 1858, Oct. At this time he was very popular in Prussia, owing to his supposed opposition to some obnoxious measures of the king's ministers, and to his vigorous advocacy of joint action with Britain and France in the war of 1854; and his election as regent was consequently opposed by the aristocratic and pietistic parties, who were, on his elevation,

dismissed from power, and a more liberal ministry formed 1861, Jan. 2, W. succeeded to the throne; and at his coronation at Königsberg Oct. 18, he himself put the crown on his head, declaring that he 'ruled by the favor of God, and of no one else.' The elections to the chamber of deputies at that time resulted largely in favor of the liberal party. W., astonished that the party whom he regarded as the opponents of the crown should have a majority, attributed it to the intrigues of secret enemies; and in his address at the opening of the chambers, saying that he 'never could permit the progressive development of our inner political life to question or to endanger the rights of the crown and the power of Prussia,' disclosed the principle of his policy—a policy which, with all the unconquerable persistence which characterizes men, like him, of thorough honesty, unflinching firmness, and no great breadth of mind, he afterward unremittingly pursued. The first chamber which sat after his coronation was dissolved, despite the protest of a large majority of the members; but the succeeding elections further increased the liberal majority; and though some popular measures were brought forward, and some obnoxious taxes abolished, the new chamber proved as refractory as its predecessor, and refused its consent to the extensive changes in the Prussian military system (the king's pet scheme), and to the raising of money by loan for that and other ministerial projects, till its constitutional powers were fully acknowledged. 1862, Sep. 22, Herr von Bismarck-Schoenhausen (see BISMARCK-SCHOENHAUSEN) was made prime minister; and the deputies having not only rejected the ministerial budget, but resolved that the expenditure of moneys not sanctioned by them was a breach of the constitution, the chamber was dissolved Oct. 14, the king declaring, by message, that as the three estates could not agree, he should continue to do his duty to his people, without regard to 'these pieces of paper called constitutions,' in which he had no faith. The number of the liberals was further increased in the following year, and the contest continued; the deputies exercising the same firmness and extreme moderation as before; while the king and his ministers made it plainly understood, that if the lower chamber did what the government asked, all would be well; but if not, the king would 'do his duty' without its aid. However, this strife between the old feudal and the modern liberal doctrines was shelved at the close of 1863, by the able strategy of Bismarck, who revived the old dispute with Denmark regarding its government of Slesvig and Holstein; and by forcing Austria to joint action, contrived to make the question one of 'German' interest: see SLESVIG. BISMARCK-SCHOENHAUSEN. From this time the nation was united in sympathy with him—convinced that his aims were honest and that his general policy for Germany was wise. Then came the war (see GERMANY—*North German Confederation*) between Prussia and Austria. W. became the head of the N. German Confederation 1867: a federal constitution and council were established, and a parliament elective by

popular suffrage; and Bismarck was made chancellor, and pres. of the council. At Ems, 1870, July, took place the memorable interviews between W. and the French ambassador Benedetti, which ended in the war of 1870–1, declared by France: see FRANCO-GERMAN WAR. W. accompanied the army, and commanded at the decisive battles of Gravelotte and of Sedan. 1871, Jan. 18, W. was proclaimed emperor of Germany in the palace of the French kings at Versailles. Soon thereafter (1872) the ancient enmity between pope and emperor was revived by the education measures of the German government: see GERMANY —*German History.* W. was made arbiter between Great Britain and the United States on the San Juan boundary question 1871, deciding in favor of the United States: see SAN JUAN ISLAND. 1878, May, the emperor was twice shot at, being seriously wounded the second time: these attempts were attributed, directly or indirectly, to socialist influence, and led to legislation for repressing socialism.— W. married, 1829, June 11, Princess Maria Louisa Catherine Augusta (see AUGUSTA) of Saxe-Weimar; by whom he had issue Frederick-William, crown-prince, afterward FREDERICK I., German emperor (q.v.), who succeeded W. 1888; and Louisa Mary, who married 1856 Frederick William, Grand Duke of Baden.

WILLIAM II. (FRIEDRICH WILHELM VICTOR ALBRECHT), third German Emperor, and King of Prussia b. 1859, Jan. 27; son of Frederick I. (German emperor and king of Prussia), and of Victoria Adelaide (princess royal of Great Britain). He succeeded to the throne on the death of his father 1888, June 15. He had been known as Prince William; was educated in the gymnasium of Cassel and the Univ. of Bonn, where he studied political science, jurisprudence, and mathematics; and 1882 was placed with Dr. Achenbach to learn the details of the civil service. At this time he was instructed also by Bismarck, whom he visited once a fortnight. He married, 1881, Princess Augusta Victoria of Schleswig-Holstein-Augustenburg; and has six sons, the eldest, the Crown Prince Friedrich Wilhelm Victor August Ernst, b. 1882, May 6. From his strong military tastes, it was thought that W. would be prone to war, on coming into power; but he professes both a policy and an expectation of peace. He was reported to have a great antipathy to everything English, and even, on his accession, to have failed in due consideration for his mother, Victoria Adelaide (daughter of Queen Victoria); but 1889, Aug., he visited the queen at Osborne, was present at army and navy reviews, and was named honorary adm. of the British navy. He has received and returned the usual visits of reigning sovereigns; and visited Athens to attend the marriage of his sister, Princess Sophie, to the crown prince of Greece, going thence to Constantinople. He has favored measures for relief of labor, and later sought to restrict free discussion. Notable was his removal, 1890, of Bismarck (q.v.) from power. He is characterized by a restless activity of mind, and by high claims for monarchical prerogative.

WILLIAM II. (Frederik George Louis Willem), King of the Netherlands: 1792, Dec. 6—1849, Mar. 17 (reigned 1840–49); b. at the Hague; son and successor of William I. W., the Prince of Orange, studied at Berlin and Oxford; and 1811, joining the army in Portugal, he served on the staff of Lord Wellington, to whom he became adjutant, and speedily obtained the rank of colonel. His bravery was conspicuous in many battles of the Peninsular campaign, also at Quatre Bras, and Waterloo, where he was wounded. He married, 1816, Anna Paulowna, youngest sister of Emperor Alexander I. of Russia. Later he was in command of the army of the Netherlands. Having more liberal views than were then common, the prince took little share in state affairs. On the abdication of his father, William I. (see Netherlands), the Prince of Orange ascended the throne (1840) as William II. The political movements of 1848 were felt in the Netherlands, as in other countries; and the ministerial plans of reform not having satisfied the party of progress, the king announced his willingness to sanction whatever changes in the constitution were thought necessary, and the storm was averted. The new constitution was proclaimed 1848. W.'s death 1849 was universally regretted. He was marshal in the Brit. army, and held a multitude of European orders.—See *Het Leven van Willem II.*, door J. J. Abbink; also the same by Bosscha.

WILLIAM III. (Alexander Paul Frederik Louis Willem), King of the Netherlands, and Grand Duke of Luxemburg; 1817, Feb. 19—1890, Nov. 23 (reigned 1849–90); b. at the Hague; son and successor of William II. In his reign the kingdom had uninterrupted peace, material prosperity increased, and the public debt was considerably reduced. W.'s reign was notable for undertakings which contribute to national greatness. The drainage of the Haarlem Lake (q.v.) was completed 1852, removing an ever-enlarging enemy, and adding nearly 50,000 acres to the wealth-producing power of the country. In 1862 the slaves in the Dutch W. Indian colonies were emancipated, under wise restrictions. Railways were extensively constructed; the water-way to Rotterdam was improved; and the Isthmus of Holland was cut by a canal, continued through the Ij. Parliamentary institutions were greatly developed. In 1866 Luxemburg and Limburg were withdrawn from the German Confederation, the latter being incorporated with the Netherlands. By W.'s first wife, a Würtemberg princess, he had two sons, the last survivor of whom was Alexander, Prince of Orange (1851–84); his second wife, Princess Emma of Waldeck-Pyrmont, bore him a daughter, Wilhelmina, 1880, who succeeded him on the throne of the Netherlands 1890, under the regency of her mother.

WILLIAM.

WILLIAM, Prince of Orange, and Count of Nassau, (surnamed THE SILENT): founder of the independence of the Netherlands; 1533, Apr. 16—1584, July 10 (ruled his inherited estates 1544-84); b. Dillenburg; son of William of Orange. His father, William, was second son of Count John of Nassau-Dillenburg, and succeeded to the German possessions of the family; while his elder brother (W.'s uncle), Henry, obtained the extensive estates in Luxemburg, Brabant, Flanders, and Holland. The latter also, by his marriage with Claudie of Chalons, added the charming little principality of Orange to his extensive domains, but his son René dying without issue, left Orange with the Low Countries' estates to his cousin, W., 1544. W. had hitherto lived at Dillenburg under the care of his father, who was a zealous Lutheran; but on his becoming the most powerful lord of the Low Countries, he was sent to the queen regent's court at Brussels, and brought up in the Rom. Cath. faith. At the age of 15 he became page to Emperor Charles V., who exercised almost paternal care of him, attentively watched his development, and took him into his inmost confidence, making him the depositary of important secrets, employing him in diplomatic offices, and, 1555, promoting him, over the heads of all his veteran officers, to command the imperial army on the French frontier. In all these situations, W. showed acute intelligence, sound judgment, and a precocious knowledge of men; while bearing himself with a grace and dignity of manner that gained universal esteem. Charles, on his abdication, strongly recommended W. to his son Philip as a confidential adviser; accordingly, we find him employed to draw up the treaty of Cateau-Cambresis, and selected as one of the four hostages to be given to France for its fulfilment. During W.'s residence in France, he was confidentially informed by Henry II. of a secret arrangement then being formed between France and Spain for the complete extermination of heretics in both countries; and with admirable nerve, dissembling his horror of the project, he resolved to oppose the execution of the scheme in the Netherlands to the uttermost of his power. This was the occasion of his being named 'the Silent;' though his disposition in general was remarkably frank and open. Returning to the Low Countries, he became the leader of the party devoted to maintaining the chartered liberties of the country; he agitated for recall of the Spanish troops, opposed the augmentation of the number of bishoprics (a pet scheme of Philip's, and finally broke entirely with Cardinal Granvelle, president of the council, and the willing agent of Philip's tyranny. Expostulations to the regent Margaret of Parma, and directly to Philip himself, far from producing any good result, seemed only to hurry the bigoted monarch to extreme measures; the cruel edicts against heretics were made still more stringent, and at the end of 1564 the Inquisition was established. W., however, steadily refused to allow these oppressive enactments to take effect in his hereditary governments of Holland and Zeeland: and though he did not join in the fa-

mous protest known as the 'Compromise' which was presented to the regent by the 'Beggars.' he supported their proposals at court, seeing that, though maintained with somewhat too much violence, their general aims were the same as his own. For the next few years he was unremitting in his exertions to impress both the rulers and the people with the desirableness of moderation, and on several occasions succeeded by his personal influence in repressing religious dissension. Hitherto he had labored conjointly with Counts Hoorn and Egmont; but failing to convince his two associates of the rank duplicity of the king, of which he himself was assured through the spies in his pay at the Spanish court, and of his perfidious designs against them, he was compelled to leave them to their fate, and retired to his German estates. Hoorn and Egmont were seized and put to death; W., cited as a rebel (1568, Jan.), and, on the ground of being a knight of the Golden Fleece and a sovereign prince, refusing to appear, had his estates confiscated; and the Duke of Alva arrived at Brussels, to reduce the provinces to submission. W. had hitherto lived in luxury and extravagance, the splendor of his household far exceeding that of his royal master; but now he effected a thorough retrenchment, and disposed of his valuables, to equip four armies for invasion of the Low Countries. Two of the armies failed completely; the third, under his chivalrous brother Louis, was destroyed at Jemmingen by Alva; and the fourth, 30,000 strong, under his own immediate command, lay in Brabant, unable to force Alva's army to a conflict, till lack of the means of paying his soldiers forced him to retreat. His next attempt was made 1572, and, though as unsuccessful on land as before, he succeeded in exciting Holland, Zeeland, Gelders, Overyssel, and the bishopric of Utrecht, to rise for their liberties; and was proclaimed by these provinces as their stadtholder for the king, whose authority he and they still acknowledged. Meantime, his coadjutors, the 'Beggars of the Sea,' had taken Brill and Flushing, and had committed heavy depredations on Spanish commerce. But erelong the fortune of the Spaniards on land was again in the ascendant; fortress after fortress fell into their hands, despite W.'s utmost efforts to relieve them; and though Holland and Zeeland still remained faithful to the cause of liberty, he found it impossible to raise an army which could fairly cope with the enemy. He succeeded, however, by breaking the dikes and flooding the country, in saving Leyden; though Antwerp and Haarlem experienced all the horrors of a siege and capture. At this period W. openly professed himself a Calvinist, though, with his usual moderation, he utterly disclaimed the bigoted fanaticism which characterized his co-religionists, and in which they rivalled their Rom. Cath. adversaries. Success still attended the patriot fleet; and though the gallant Louis, with his brother Henry, was defeated and slain at Mocker-Heide (1574), the ruinous condition of the Spanish finances, and the general detestation in which the soldiers of Philip were justly held, helped W. to hold

his ground. In 1575, Mar., conferences were opened at Breda between the belligerents; but Philip obstinately refusing to yield an iota, they were broken off; and in Oct. the provinces of Holland and Zeeland pronounced Philip's deposition, and gave power to W. to choose the country under whose protectorate they were to be placed. Meantime the rapacity of the Spanish soldiery had roused the 15 provinces which still remained loyal to Philip, and the league known as the *Pacification of Ghent*, 1576, Oct., whose object was to drive out the foreign troops, and establish, at least for a time, toleration in religion, was the consequence. This was a brilliant success for W.; and though Don John of Austria, the new governor, tried to dissolve it by the 'Perpetual Edict' (1577, Feb. 12), in which he granted nearly all demands, W. succeeded by skilful policy in foiling the attempt. War was accordingly resumed, and the patriots were defeated at Gembloux (1578, Jan. 31), though their spirits were afterward buoyed up by an occasional success. The next governor, Alexander Farnese, succeeded, however, in detaching the Walloon provinces from the league, though, to compensate for this, W. obtained the signature of the *Union of Utrecht* (1579, Jan. 23), the first foundation of the Dutch Republic. In the following year, his two faithful provinces, Holland and Zeeland, after having been nominally under the sway of Archduke Matthias of Austria, and of the Duke of Anjou, proclaimed W. their sole ruler, the Duke of Anjou being still acknowledged as sovereign of the others. W., however, after his long and desperate struggle for his country's freedom, did not long enjoy the honors of sovereignty, for, 1580, Mar. 15, Philip had, by Granvelle's advice, put a price of 25,000 gold crowns on his head; and the incitement of this immense bribe produced various attempts to assassinate him, the last of which, by Balthasar Gerard, was successful at Delft, 1584. W. was four times married; and left by his first wife (Anne of Egmont) Philip-William, Prince of Orange; by his second (Anne of Saxony) the famous Maurice (q.v.); and by his fourth (Louise. de Coligny) Frederick-Henry, who succeeded Maurice as stadtholder of Holland.

WILLIAM OF MALMESBURY: see MALMESBURY, WILLIAM OF.

WILLIAM OF OCCAM: see OCCAM, WILLIAM OF.

WILLIAM OF WYKEHAM: see WYKEHAM, WILLIAM DE.

WILLIAM THE SILENT: see WILLIAM, Prince of Orange, and Count of Nassau.

WILLIAM AND MARY COLLEGE: oldest college next to Harvard, in the United States; at Williamsburg, Va., and named at its foundation (1693) from the reigning king and queen of England, William III. and Mary, who devoted lands, funds, and a duty on tobacco to its endowment and maintenance. Sir Christopher Wren planned its buildings, of which the first was burned 1705, and rebuilt. Before the revolution, the endowment, together with public and private gifts, and a part of the income of a fund

left by the philosopher Robert Boyle (and devoted to Indian students), gave this institution larger resources than those of any other in the colonies. The revolutionary war reduced it to poverty, but it was revived afterward, with less of a theological and missionary and more of a scientific and university cast. In 1859 it again was ravaged by fire and was reduced by the expense of rebuilding; and it was suspended in the civil war and the buildings partly burned. The main edifice was restored, and college reopened 1869.

The institution has at times had chancellorships, at first the bishops of London; subsequently, at intervals, George Washington, John Tyler, and others. It claims to have been the first in the United States to introduce lecturing—viz., in nat. philos. by Dr. Small 1758; the first in America to establish a chair of municipal law, 1779, and the first, the same year, to announce an elective system of study; the first to introduce a univ. system and assume the title, 1782; and the first to found a professorship of hist. and polit. science, 1822. Its long roll of graduates records the names of Jefferson, Monroe, Tyler, the first Peyton Randolph, Judge Marshall, Gen. Scott, and other distinguished men. Since 1888 the president of the college is the Hon. Lyon Gardiner Tyler, son of Pres. John Tyler by his second wife, and author of the Tyler biographies, and of *Parties and Patronage in the United States* (1891). In 1888 the Va. general assembly passed an act to appropriate annually the sum of $10,000 for a normal school of three years in connection with the institution. The courses of study in other depts. are junior and senior in moral science, polit. econ., and civil govt.; junior, intermediate, and senior I. and II. in English and hist.; the same in mathematics and in languages; and the same, with but one year senior, in nat. science. The usual degrees are conferred. There are a few scholarships and prizes. The library (former valuable collections having been destroyed) numbers about 10,000 vols. There is a prosperous Young Men's Christian Assoc. The college receives annually from the legislature $25,000. The students and faculty number about 175. The campus consists of 42 acres.

WILLIAM JEWELL COLLEGE: located at Liberty, a suburb of Kansas City, Mo. It was founded in 1849 by the Baptists of Missouri; Dr. William Jewell of Columbia, Mo., was one of the leaders in the movement for the establishment of the college, and contributed $10,000 in lands toward the endowment, hence the college was named for him. It was opened to students in 1850, and on account of financial difficulties was closed in 1855-7; just as the college was becoming prosperous, the civil war again forced the work to suspend from 1861 to 1868; for a part of that time the building was occupied by the Federal troops. Since 1877 the endow-

ment has been raised to over $200,000. The college offers four courses or groups, leading to the degree of A.B. Some studies are required in all groups, and some are free electives. The curriculum includes several theological courses, completion of which by arrangement with the Southern Baptist Theological Seminary at Louisville, Ky., entitles the student to credit at that seminary. The degree of A.M. is conferred for graduate work. There are also courses in elocution and oratory and music, and an Academic Department. A college band and a college orchestra are maintained. There are 44 scholarships. The student organizations include four literary societies, Philharmonic (a musical society), a Young Men's Christian Association, and missionary societies. The buildings include Jewell Hall (the original building), Vardeman Hall, Brown Hall, Wornall Hall, Ely Hall, The Cottages, and the gymnasium. The library contains 10,000 volumes; the students number 345, and the faculty 21.

WILLIAM PENN CHARTER SCHOOL: a secondary day school for boys, located at Philadelphia. In 1683 the governor and council of the province engaged a schoolmaster (Enoch Flower) for 'the instruction of the youth' of Philadelphia; from this grew the Charter School, founded in 1689 and incorporated in 1698 by the council and lieutenant-governor as 'the public school founded in Philadelphia at the request, costs, and charges of the people of God called Quakers.' Although supported by the Quakers, it was open to all, and for more than 60 years continued to be the only public place for instruction in the province. In 1701 Penn was asked to confirm the lieutenant-governor's charter by one under his own hand and seal. This he did on the same day that he chartered the city itself. The school therefore enjoys, in this regard, a unique distinction. The two subsequent charters issued by Penn, one in 1708 and the other in 1711 (the last the legal one under which the board now works) rendered broader and more far-reaching the measures for the school's future development. The school was entirely emancipated from denominational control, and the title of the corporation changed by omitting the words: 'at the request, costs and charges of the people of God called Quakers,' the title in the final charter standing: 'The Overseers of the Public School founded by Charter in the Town and County of Philadelphia in Pennsylvania' (the word 'public' being used in the English sense, open to all willing to pay the fees). The school premises are now located in the heart of the city, and taken with the beautiful playing fields in the suburbs of the city, presented to the school in 1903, are valued at $250,000; and the scholarship funds amount to about $50,000. It is purely a day college preparatory school for boys, and has for years been famed for both its high standard of scholar-

ship and the intelligent care devoted to physical training. The students number over 500, it being the largest boys' day school of its class in the United States.

WILLIAMS, *wil'yamz*, ALPHEUS STARKEY: soldier: 1810, Sep. 10—1878, Dec. 21; b. Saybrook, Conn. He graduated at Yale 1831, and studied law. After traveling in Europe, he began the practice of law in Detroit 1836; was judge of probate of Wayne co., Mich., 1840-44; and became proprietor of the Detroit *Daily Advertiser*, and its editor 1843-48. He served as lieut.-col. in the Mexican war, and on the breaking out of the civil war commanded a division in the Shenandoah valley, with rank of brig.gen. of vols. He was in the battles of South Mountain, Antietam, and Gettysburg; was transferred to Tennessee, and commanded the 20th corps in Sherman's march to the sea, and in the subsequent Carolina campaign. He was promoted brevet maj.-gen. vols. 1865, and mustered out of service 1866; was minister to San Salvador 1866-69, and representative in congress 1874-78. He died at Washington.

WILLIAMS, ANNIE BOWLES 'JAK': American writer of juvenile tales: b. Connecticut 1840. She published *Birchwood* (1885); *The Fitch Club; Professor Johnny* (1887); *Rolf and His Friends; Who Saved the Ship?; The Giant Dwarf; The Riverside Museum;* etc.

WILLIAMS, ARTHUR LLEWELLYN, D.D.: American Protestant Episcopal bishop: b. Owen Sound, Ont., 1856, Jan. 30. He received an academic education and engaged in the railroad business in Colorado for several years. He then studied theology and was graduated at the Western Theological Seminary, Chicago, in 1888. Admitted to the diaconate in 1888, and to the priesthood in 1889, he served as missionary in White River Valley, Colo., 1888-9, was rector of St. Paul's Church, Denver, 1891-2, and of Christ Church, Chicago, 1892-9. In Oct., 1899, he was consecrated bishop-coadjutor of Nebraska.

WILLIAMS, BENJAMIN: 1754-1814; b. North Carolina. He served in the revolutionary army, and was promoted col. for service at Guilford. He served in the legislature; was member of congress 1793-95; governor of N. C. 1799-1802 and 1807-8; and member of the state senate 1808-9. He died in Moore co., N. C.

WILLIAMS, CHANNING MOORE, D.D.: American Protestant Episcopal bishop: b. Richmond, Va., 1829, July 18. He was graduated from William and Mary College in 1853 and from the Theological Seminary at Alexandria, Va., in 1855. He took deacon's orders in 1853 and was ordained to the priesthood in 1857. He served as a missionary in China in 1857-66 and in the last mentioned year was consecrated bishop of Yeddo, Japan, resigning his bishopric in 1889, when he retired from episcopal duties, but continuing his missionary labors.

WILLIAMS, Edward (bardic name, Iolo Morganwg): Welsh poet and Celtic scholar: b. Llanearvan, Glamorganshire, 1745; b. Flemingstone, Glamorganshire, 1820, Dec. 17. With Owen Jones and Pughe, he edited the *Myvyrian Archæology* (1801-7), and himself published *The Fair Pilgrim, a Poem Translated from the Welsh* (1792); *Poems Lyric and Pastoral* (1794); *Psalms of the Church in the Desert* (1812) in Welsh. To the *Fair Pilgrim* he appended specimens of Druidical *Triads,* which, after a long protracted controversy and on the non-production of their manuscripts, are commonly looked on as a literary forgery. Williams was a friend of Southey and ranked foremost among Welsh poets of this time. His posthumous Welsh work, *Secrets of the Bards of the Isle of Britain* (1829) was edited by his son, Taliessin Williams. Consult: Waring, *Recollections and Anecdotes of Edward Williams* (1850).

WILLIAMS, Eleazer: about 1787-1858, Aug. 28; b. Caughnawaga, N. Y.; reputed great-grandson of Eunice, daughter of John Williams (1644-1729) (q.v.). He was educated at Long Meadow and Westhampton, Mass. In the war of 1812 he was supt.gen. of the northern Indian dept., and was severely wounded at the battle of Plattsburg. He was ordained in the Prot. Episc. Church, and worked among the Oneida Indians, removing with them to Green Bay, Wis. In 1853, Feb., an article by Dr. Hanson, entitled *Have We a Bourbon among Us?* was published in *Putnam's Magazine,* setting forth Williams' apparently sincere claim to be the lost dauphin of France, son of Louis XVI. and Marie Antoinette; and in 1854 Dr. Hanson published *The Lost Prince,* attempting to show Williams' identity with the dauphin. The claim has not been generally regarded as established. Williams was interested in genealogical studies, and was an authority on Indian subjects. He published: *A Spelling-book in the Language of the Seven Iroquois Nations* (1813); *A Caution against our Common Enemy,* in Iroquois (1813); *Life of Te-ho-ra-gwa-ne-gen, alias Thomas Williams* (1859); and Iroquois transl. of *The Book of Common Prayer* (1853).

WILLIAMS, Eliphalet Scott: Baptist minister: 1757, Oct. 7—1845, Feb. 3; b. East Hartford, Conn.; descendant of John Williams (1644-1729) (q.v.). He graduated at Yale 1775; joined the revolutionary army, and took part in the battles at Princeton and Trenton; and later enlisted in the navy, and was in the engagement between the *Hancock* and the *Levant.* He was employed in farming and teaching in Maine; was ordained to the ministry 1799; Bapt. pastor at Beverly, Mass., 1803-12, resigning to become minister at large, with residence at Boston. He died at Beverly.

WILLIAMS, Elisha: Congregational minister: 1694, Aug. 24—1755, July 24; b. Hatfield, Mass. He grad-

uated at Harvard 1711; studied law, and settled at Wethersfield, Conn., which he represented in the state general assembly; taught at Wethersfield; was ordained to the ministry 1721; Congl. pastor at Wethersfield 1721-26; president of Yale College 1726-39; and subsequently representative in the legislature and justice of the superior court. He was a chaplain in the Conn. troops in Cape Breton 1745; and 1746 appointed col. of a regt., raised for a proposed expedition to Canada. He failed in a mission to England 1749 to secure the wages of his troops.

WILLIAMS, Ephraim: soldier: 1715, Feb. 24—1755, Sep. 8; b. Newtown, Mass. In early life he crossed the ocean several times as a sailor. In the war with France 1740-48, he served in Canada. The state of Mass. granted him 200 acres of land in 1750 in the present towns of Adams and Williamstown, where 1751 he erected Fort Massachusetts, and was made commander of the frontier-posts w. of the Connecticut river. In 1755 he marched with a regt. to join Sir William Johnson; fell into an ambuscade near Lake George, and was killed at the first fire. At Albany, while on the march, he made a will, leaving the greater part of his property to found a free school at Williamstown, which afterward became Williams College (q.v.). The students of the college erected 1854 a bowlder monument on the spot where he fell.

WILLIAMS, Francis Churchill: American author, son of Francis Howard Williams (q.v.): b. Philadelphia, Pa., 1869, Apr. 23. He was graduated from the University of Pennsylvania in 1891 and until 1900 was engaged in journalism. His publications include: *J. Devlin, Boss* (1901); *Stories of the College,* joint author (1902); *The Captain* (1903); etc.

WILLIAMS, Francis Howard: American dramatic writer: b. Philadelphia, Pa., 1844. Among his plays are: *The Princess Elizabeth: A Lyric Drama* (1880); *The Higher Education* (1881); *A Reformer in Ruffles* (1881); *Master and Man* (1884). He has also written *Atman: A Story* (1894); *The Flute Player, and Other Poems* (1894); *Pennsylvania Poets of the Provincial Period* (1893); etc.

WILLIAMS, Sir George: English founder of the Young Men's Christian Association: b. Dulverton, Somerset, 1821, Oct. 11; d. London, 1905, Nov. 6. He began his business career at Bridgewater, became converted in 1837 and was active in attempts to promote the religious welfare of his associates. In 1841 he went to London, gathered together the young men employed in the same establishment as himself, and on June 12, 1844, organized, with others, a society called the 'Young Men's Christian Association,' which was designed to be 'a society for improving the spiritual condition of young men engaged in the drapery and other trades.' He was

treasurer of the Young Men's Christian Association, 1863-85, and succeeded Lord Shaftesbury as its president in the last named year. He was knighted in 1894. (See YOUNG MEN'S CHRISTIAN ASSOCIATION.) Consult Stevenson, *Historical Records of the Young Men's Christian Association from 1844 to 1884.*

WILLIAMS, GEORGE FREDERICK: American politician: b. Dedham, Mass., 1852, July 10. He was graduated from Dartmouth in 1872, studied later at Heidelberg and Berlin, was admitted to the bar and has since practiced his profession in Boston. He edited Williams' *Citations of Massachusetts Cases,* and the *Annual Digest of the United States,* Vols. X. to XVII. He was a member of the state legislature in 1889, sat in congress 1891-3, and was an unsuccessful democratic candidate for governor of Massachusetts in 1895, 1896, and 1897.

WILLIAMS, GEORGE WASHINGTON: author: 1849, Oct. 16—1892; b. Bedford Springs, Pa.; of mixed negro and white parentage. He was in military service in the civil war, and afterward in the Mexican republican army. After attending school near Boston, he preached in that city; did editorial work; took a course in the Cincinnati Law College, and was in the Ohio legislature 1879-81. For two years he was judge-advocate-gen. in the grand army, and was U. S. minister to Hayti 1885-6. He was editor of the *Southwestern Review* at Cincinnati, and *The Commoner* at Washington; and wrote a *History of the Negro Race in America* (1883); *History of the Negro Troops in the War of the Rebellion* (1887); and *History of the Reconstruction of the Insurgent States* (1889). He died in Liverpool, England.

WILLIAMS, HENRY SHALER, PH.D.: American geologist and palæontologist: b. N. Y., 1847, Mar. 6. He was graduated from Yale in 1868, occupied the chair of geology at Cornell in 1879-92, resigning in the last mentioned year to accept a similar chair at Yale, which he occupied until 1904 when he again became professor of geology at Cornell. He was secretary of the International Congress of Geologists at Washington in 1891 and was chairman of the section of geology and geography of the American Association of Advanced Sciences in 1892. He has made extensive studies of the Devonian and Carboniferous systems and has published: *The Classification of the Upper Devonian* (1885); *Fossil Faunas of the Upper Devonian* (1884-7); *The Cubiodes Zone and Its Fauna* (1890); *Correlation Papers, Devonian and Carboniferous* (1891); *Shifting of Faunas as a Problem of Stratigraphic Geology* (1903); etc.

WILLIAMS, ISAAC: English theologian and author: b. near Aberiptwith, Cardiganshire, 1802, Dec. 12; d. Stinchcombe, Gloucestershire, 1865, May 1. He studied at Trinity College, Oxford, in 1831 became fellow there and took priest's orders, and was known as one of the

leading Tractarians. He was Newman's curate at St. Mary's and was later in charge of the church at Littlemore. With Newman, Froude, and Keble, he contributed to the *British Magazine* the verse later collected as *Lyra Apostolica* (1836); and in the *Tracts for the Times* he wrote Tract 80, *Reserve in Communicating Religious Knowledge*, the subject of much discussion. In 1842 he was an unsuccessful candidate for the Oxford chair of poetry, the defeat being regarded as also the first for the Tractarians as a party. From 1842 to 1848 he was curate at Dartington, and afterward resided at Stinchcombe, where he assisted somewhat in the clerical duties of the parish. Among his further publications are several books of poetry, such as *The Cathedral* (1838; 8th ed. 1859; reprinted 1889 ed. Benham); *Thoughts in Past Years* (1838; 6th ed. 1852), and *The Baptistery, or the Ways of Eternal Life* (1842-4; 6th ed. 1863); and some volumes of prose, chiefly sermons. *Selections* from his writings appeared in 1890; his *Autobiography* in 1892.

WILLIAMS, James: soldier in the revolution: 1740-1780, Oct. 8; b. Hanover co., Va. He lived for a time in Granville co., N. C., whence he removed to Little River, S. C. He was a member of the S. C. provincial assembly 1775; was appointed lieut.col. of state forces 1776; participated in the battle of Stono, and gained a victory at Musgrove's Mills, 1780, Aug. He was killed while leading one of the attacking columns in the battle of King's Mountain.

WILLIAMS, Jesse Lynch: civil engineer: 1807, May 6—1886, Oct. 9; b. Westfield, N. C.; of a family belonging to the Society of Friends, and subsequently removing to Ohio and to Indiana. Beginning as rodman, he became an engineer of western canals; 1837 chief engineer of the state of Indiana; 1853 chief on the Pittsburgh, Fort Wayne and Chicago line; in 1864-69 govt. director of the Union Pacific, locating a part of the line; and 1869-71 receiver of the Grand Rapids and Indiana road. He was prominent in assemblies of the Presbyterian Church, and a director of its seminary in Chicago. He died in Fort Wayne, Ind.

WILLIAMS, John: Congregational minister: 1644, Dec. 10—1729, June 12; b. Roxbury, Mass. He graduated at Harvard 1683, and was pastor in Deerfield, Mass., 1688 until his death. In 1704 a force of French and Indians surrounded the town; killed a number of the people, including two of Williams' children; and led him, his remaining family, and (it is said) 300 other captives to Canada, Mrs. Williams being killed by the savages on the way, when she had fallen from exhaustion. Williams was redeemed from his captivity, and resumed his charge at Deerfield. He wrote a narrative of the events, *The Redeemed Captive* (1707), and a me-

moir of him was published by Stephen W. Williams, 1837.—His daughter, EUNICE WILLIAMS, b. 1696, was aged 8 when carried into the captivity, and her release was sought in vain. As she grew up, she became a Roman Catholic; married an Indian, John de Rogers; and, though she visited her relatives, refused to give up her Indian ways, or to accept a bounty of land offered by Mass. to induce her to return. She was the reputed great-grandmother of the Rev. Eleazer Williams (q.v.), afterward in discussion as the abducted son of Louis XVI. of France.

WILLIAMS, JOHN: English prelate, archbishop of Canterbury: b. Aberconway, Carnavonshire, Wales, 1582, Mar. 25; d. Glodded 1650, Mar. 25. He was educated at Cambridge, took orders in the English Church in 1609, succeeded Bacon as keeper of the great seal in 1621, an office which he held till 1626, and was consecrated bishop of Lincoln in Nov. 1621. Though a favorite with James I. he incurred the dislike of Charles I., and having supported the Petition of Right in 1628, was prosecuted by Laud before the Star Chamber, charged with betraying the king's secrets. After eight years' legal proceedings he was suspended from his see, fined successively £10,000 and £8,000 and imprisoned in the Tower 1636-40. Released by the Long Parliament and restored to his see, he was made archbishop of Canterbury in 1641, but was again sent to the Tower with 11 other bishops on account of their protest against the validity of acts passed during their enforced absence from the House of Lords. He was released in 1643 and during the civil war supported the royal cause and fortified and held Conway Castle. Consult: *Scrinia Reserata*, a Latin life of the prelate, by Hacket and Philips (1700).

WILLIAMS, JOHN ('ANTHONY PASQUIN'): English author: b. London, 1761, Apr. 28; d. Brooklyn, N. Y., 1818, Oct. 12. He was educated at the Merchant Taylors' School, London, went to Ireland about 1781, edited various periodical publications, and in 1784 was obliged to flee the country to escape prosecution for an attack upon the government. In 1787 he went to France and on his return established the Brighton *Guide*. He was afterward engaged as a dramatic critic and by his ruthless sarcasm made himself the terror of the theatrical world. In 1797 he sued Robert Faulder, a bookseller, for libel, the latter having denounced him as 'lost to every sense of decency,' but was nonsuited in his case because of proof that he himself had grossly libeled every respectable character in the kingdom, not sparing even the sovereign. Shortly afterward he came to the United States, where he edited in New York a democratic newspaper. He died in poverty. His publications include: *Poems* (1789); *Legislative Biography* (1795);

Life of Alexander Hamilton (1804); *The Dramatic Censor* (1811); etc.

WILLIAMS, JOHN: Christian missionary: 1796, June 29—1839, Nov. 20; b. Tottenham, London. At the age of 14 he was apprenticed to an ironmonger, and during his apprenticeship acquired a knowledge of mechanic arts, which he afterward turned to great account. Having become deeply religious, he offered himself to the London Missionary Soc. (a soc. directed largely by Eng. Congregationalists) as a missionary to the South Seas. He was ordained 1816, and sent to Eimeo, one of the Society Islands. Two months after his arrival, he was able to preach to the people in their native tongue. From Eimeo he soon went to Huaheine, and afterward to Raiatea, the largest of the Society group. His labors here were attended with great success; the island became Christian, and the arts and habits of civilization were introduced with Christianity. Wherever Williams went, he not only preached the gospel, but instructed the people in the arts, so as to elevate them from their barbarism. At Raiatea he heard of Raratonga, the chief of the Hervey Islands, and thither he went 1823. The mission which he founded there was eminently successful; not only Raratonga but the whole group of the Hervey Islands being soon Christianized. In his missionary work, Williams made great use of native teachers, trained by himself. He translated the New Testament into the Raratongan language, and prepared books for the schools which he established. After spending some time in Raratonga, he wished to return to Raiatea; but the island in which he lived lay out of the way of vessels, and he resolved to build one. He made all the necessary tools, and in about 15 weeks, with the help of natives whom he trained to the work, he completed the vessel, 60 ft. long, 18 wide, the sails of native matting, the cordage of the bark of the *Hibiscus*, the oakum of cocoa-nut husks and banana stumps. In this vessel, during the next four years, he visited many of the South Sea Islands, extending his missionary labors to the Samoa Islands. In 1834 he went to England, where he remained nearly four years, during which he procured the publication of his Raratongan New Testament by the Bible Society, and raised £4,000 for the purchase and outfit of a missionary-ship for Polynesia. In 1838 he returned to his chosen sphere of labor, visited many of the islands, and finally the new Hebrides, where he hoped to plant a mission, but was killed by the savage natives of Erromanga, on whose unknown shores he had landed. His death was the occasion of great lamentation in the islands which owed to him their Christianization and civilization. Williams was remarkably successful as a missionary, not only by his own preaching, but through the instrumentality of natives whom he trained. He possessed in an extraordinary degree the power of organiz-

ing. His mechanical skill and genius also were of great service; and probably no other missionary has ever been so successful in making the progress of civilization attend on the progress of Christianity.—See *Memoir* by Ebenezer Prout (London 1843).

WILLIAMS, JOHN, D.D., LL.D.: Protestant Episcopal bishop: b. Deerfield, Mass., 1817, Aug. 30; d. 1879, Feb. 3. After two years at Harvard, he graduated at Trinity College, Hartford, 1835, where he was tutor 1837-40. Meanwhile, having studied theology with Prof. Jarvis, he was ordained 1838. He was assistant minister in Middletown, Conn.; rector in Schenectady, N. Y.; and 1848 became president of Trinity College, and professor of history and literature. Two years before resigning this office, he was elected assistant bishop of Connecticut, 1851; and succeeded as sole bishop 1865. As a result of his extra labors in teaching theological students, while professor, the Berkeley Divinity School was founded at Middletown, Conn., 1854, of which he became dean, and chief instructor in theology and other studies. He lectured on history at Trinity College, and 1881 gave the Paddock lectures in the General Theological Seminary, New York, and the Bedell course at the Gambier Institution, Ohio. He was chairman of the house of bishops, and presiding bishop of the church. In all his positions he showed ability and learning, sound judgment and Christian earnestness, with eloquence as a speaker. To the church weeklies and reviews he was a frequent contributor; and published many discourses and addresses, including one on *Everlasting Punishment* (1865); also, in book form, *Ancient Hymns of the Holy Church* (1845); *Thoughts on the Gospel Miracles* (1848); *The English Reformation* (1881); *The World's Witness to Jesus Christ* (1882); *The Seabury Centenary* (1885); and *Studies in the Book of Acts* (1888).

WILLIAMS, JOHN FOSTER: naval officer in the revolution: 1743, Oct. 12—1814, June 24; b. Boston. Trained to a seafaring life, he had command of a cruiser, the *Hazard*, and in 1779 captured the British vessel *Active*, with a superior armament. The next year, in command of the *Protector*, he encountered and blew up the privateer *Admiral Duff*. Among his many daring adventures, he attacked the frigate *Thames*, but made good his escape from his far too powerful antagonist. He took many prizes on the northern coast, also in the West Indies, where at last he was forced to surrender when at disadvantage, and was held prisoner until the end of the war, after which he was in the revenue service. He died in Boston.

WILLIAMS, JOHN JOSEPH, D.D.: Roman Catholic archbishop: b. Boston, 1822, Apr. 27; d. Boston, Mass., 1907, Aug. 30. His education, begun in Boston, was completed in the College of Montreal 1841, after which he studied

theology and was ordained in Paris 1845. Assistant in the cathedral at Boston, he became its rector 1855, and pastor of St. James's 1857. He was made assistant bishop of Boston 1866, and succeeded to the bishopric the same year. After the institution of the dioceses of Springfield and Providence, he was made archbishop, the new province including also the sees of Portland and Burlington. He has been active in establishing church institutions, among them the Sulpitian Theological Seminary. The archiepiscopal province of Boston now includes the additional sees of Manchester, N. H., and Hartford, Conn.

WILLIAMS, JONATHAN: soldier: 1750, May 26—1815, May 16; b. Boston. In youth he was engaged in mercantile pursuits in his native city, and on voyages. His granduncle, Benjamin Franklin, employed him as bearer of dispatches, and as secretary to the embassy in Paris. From 1785 he was judge of the court of common pleas in Philadelphia, until 1801, when he was commissioned major in the artillery and engineer service of the U. S. army, having studied the science of these branches while in France. He was stationed at West Point, where he became first superintendent of the Military Academy, founded 1802, resigning 1803, but resuming 1805, with rank of lieutenant-colonel and chief engineer. He designed and built the inner defenses of New York harbor; Castle Williams was named after him; but he resigned from the army when the command of this fort was refused to him at the beginning of the war in 1812. He is honored as 'the father of the corps of engineers.' He published translations of works on fortification and on maneuvers for horse artillery. His recommendation to congress included the full West Point system of instruction, afterward adopted.

WILLIAMS, OSCAR FITZALAN: American diplomat: b. Livonia, N. Y., 1843, June 29. He was graduated from Cornell in 1869; engaged in teaching at a business college for 20 years, publishing several commercial textbooks, and was consul to Havre, France, 1889-93. After the Spanish-American war he was active in the adjustment of the Philippine Islands to their new conditions. He was the last United States consul in Manila, having been appointed in 1897. Since 1901 he has been consul-general at Singapore, Straits Settlements.

WILLIAMS, OTHO HOLLAND: revolutionary soldier: 1749, Mar.—1794, July 16; b. Prince George co., Maryland; descended from some of the earliest settlers of Maryland. He was left an orphan when 12 years old. At the beginning of the revolutionary war he was appointed lieutenant of a rifle corps; marched to Boston, where he was promoted captain 1776; taken prisoner at Fort Washington, and released on parole, but for fear that he would open a correspondence with Washington, was reapprehended and kept in confinement for 15

months. He was appointed colonel of the 6th Maryland regiment; adjutant-general of the southern army 1780-83; did good service at the battle of Camden; commanded the rear-guard in Greene's retreat; took part at Guilford and Hobkirk Hill; decided the day at Eutaw Springs; and was sent with dispatches to congress, which promoted him brigadier-general 1782. After the war he settled at Baltimore, and was collector of the port 1783-94. He published *Narrative of the Campaigns of 1780.* See sketch of his life, by Osmond Tiffany (1851).

WILLIAMS, Roger: founder of the state of Rhode Island: about 1600-83; b. of Cornish parents [another account gives, about 1606-83; b. Wales]. In his youth he went to London, and attracted the attention of Sir Edward Coke by his shorthand notes of sermons, and of speeches in the Star Chamber; and was sent by him to Sutton's Hospital, now the Charterhouse School, 1621. Williams matriculated probably at Pembroke College, Cambridge, 1625, taking his degree 1627 [another account says that he entered Jesus College, Oxford, 1624]. He studied Latin, Greek, Hebrew, French, and Dutch, and was ordained a clergyman of the Church of England but soon became an extreme Puritan, and emigrated to New England, arriving at Boston 1631, Feb. 5, 'a young minister, godly and zealous, with his wife Mary.' He refused to join the congregation at Boston, because the people would not make public declaration of their repentance for having lived in communion with the Church of England, nor declare themselves fully separated therefrom: he therefore went to Salem, as assistant pastor, but was soon in trouble for denying the right of magistrates to punish Sabbath-breaking and similar religious offenses. For such opposition to the theocracy of those times, he was compelled to leave Salem, and took refuge with the more tolerant colony at Plymouth, where he studied Indian dialects and was assistant pastor (1631, Aug.). Two years later he returned to Salem, and 1634 was settled as pastor there. But he met renewed persecution and banishment from the Massachusetts colony, for denying the validity of the Massachusetts charter granted by Charles I. 1629, since, as he said, the king of England had no right thus to give away the land that belonged to the Indians. He denied also the right of a government to impose faith and worship; holding that it was not lawful to require a wicked person to take a judicial oath or to pray, which both were forms of worship; and that the power of the civil magistrate extends only to the bodies, goods, and outward state of men, and not to their souls and consciences. Banished from the colony 1635, and threatened with being sent back to England, he escaped through the wilderness to the wigwams of the Pokanokets, whose chief, Massasoit, granted him and his few adherents land on Seekonk river. But

LANDING OF ROGER WILLIAMS.

1636, June, to avoid possible complications with the Plymouth colony, Williams with five others embarked in a canoe for Rhode Island, and at the head of Narragansett Bay founded the city which he piously named Providence. On this tract, granted by the powerful Narragansett chiefs Canonicus and Miantonomoh, Williams established a government of pure democracy and of full religious toleration. Having adopted the belief in the baptism of only adult believers, and by immersion, Williams was so baptized by a layman, and then baptized him and ten others, thus founding the first Baptist church in America (1639). About four months afterward, Williams doubted the apostolic validity of this baptism, and withdrew from the church that he had founded. In 1642 he went to England to procure a charter for his colony, and published a *Key to the Languages of America;* also *The Bloudy Tenent of Persecution for Cause of Conscience Discussed,* etc.—his chief work on the nature and sphere of civil government. This book, which had much literary merit, was answered by a book from John Cotton. After returning to Rhode Island, Williams went a second time to England on business of the colony 1651, when he published *Experiments of Spiritual Life and Health, and their Preservations,* dedicated to his friend, Lady Vane, and written, as he says, 'in the thickest of the native Indians of America, in their very wild houses, and by their barbarous fires;' also, *The Hireling Ministry none of Christ's,* and (in rejoinder to Cotton) *The Bloudy Tenent yet more bloudy by Mr. Cotton's Endeavour to wash it White in the Blood of the Lamb.* At this period he engaged in an experiment of teaching languages by conversation, and was in friendly intercourse with Milton and Cromwell. He returned to Rhode Island 1654, and was elected president of the colony; refused to persecute Quakers, but held a keen controversy with them, and published *George Fox digged out of his Burrowes.* On one occasion, to meet three Quakers in public debate, Williams rowed in his boat 30 m. to Newport (he was then 72 years of age). Williams, by his constant friendship with the Indians, was enabled to render inestimable service to the other infant colonies in their weak and exposed condition. Though these services were recognized, and Williams's opponents spoke of him personally in such terms as were only the due of his excellent Christian character, the other colonies—fearful amid the uncertainties and conflicts of that stormy time—did not admit Rhode Island to their league. —As a great pioneer of governmental liberalism and of individual Christian liberty, Williams ranks undoubtedly among the chief figures of the 17th century.—See Memoirs, by James D. Knowles (Boston, 1833); William Gammell (Boston, 1846); Romeo Elton (London, 1852); R. A. Guild's *Biographical Introduction,* etc. (Providence,

1866). Williams's works, in 7 vols., have been republished by the Narragansett Club (Providence).

WILLIAMS, Rowland, D.D.: 1817, Aug. 16—1870, Jan. 18; b. Halkyn, Wales. He studied at Eton; graduated at King's College, Cambridge, 1841; and was tutor there 1842-50. He became chaplain to the bishop of Llandaff 1850; was vice-principal and professor of Hebrew at St. David's College, Lampeter, Wales, 1850-62; select preacher to the University of Cambridge 1854; and appointed vicar of Broad Chalk 1859. He was concerned in the 'broad-church' movement, and was active in university reform. He was one of the contributors to *Essays and Reviews* (1860), and was condemned for heresy by the court of arches 1862, but the judgment was reversed by the privy council 1864. Among his works are: *Rational Godliness* (1855); *Christianity and Hinduism* (1856); *Broad Chalk Sermons* (1867); *The Hebrew Prophets, a New Translation* (2 vols. 1868-71); *Owen Glendower* (1870); and *Psalms and Litanies* (1872).

WILLIAMS, Samuel, LL.D.: Congregational minister: 1743, Apr. 23—1817, Jan. 2; b. Waltham, Mass.; grandson of John W. (1644-1729) (q.v.). He graduated at Harvard 1761; accompanied Prof. John Winthrop to Newfoundland to observe the transit of Venus 1761; taught at Bradford while studying theology; Congregational minister at Bradford 1765-80, continuing his school; and instructed Sir Benjamin Thompson (Count Rumford, q.v.) in natural philosophy, afterward keeping up a scientific correspondence with him. He was Hollis professor of mathematics and natural philosophy in Harvard 1780-88; surveyed the w. coast of Massachusetts 1786; and preached in Rutland, Vt., 1789-95, and in Burlington about two years. He became editor and proprietor of the Rutland *Herald;* surveyed the w. boundary of Vermont 1805; and soon after the establishment of the University of Vermont lectured there for two years on astronomy and natural philosophy. He was a member of several scientific societies, left valuable MSS. on philosophical subjects, and published *The Natural and Civil History of Vermont* (1794). He died at Rutland.

WILLIAMS, Samuel Wells, LL.D.: foreign missionary and author: 1812, Sept. 22—1884, Feb. 16; b. Utica, N. Y.; descendant in the sixth generation from Robert Williams, a Puritan settler of Roxbury, Mass. Williams began study 1831 at the Rensselaer Polytechnic Institute, Troy, N. Y., and while there was engaged to go to China in charge of printing operations under the American Board of Foreign Missions. At Canton, 1833, Oct. 25, he joined E. C. Bridgman in the editorship of the *Chinese Repository,* which he both edited and printed until 1851, his own contributions numbering about 130. In 1835, at Macao, he undertook to complete the printing of Medhurst's Hokkeën dictionary, with the font of Chinese type

left by the East India Company's China branch, which had been given up. During 1837-8 he began to print Bridgman's *Chinese Chrestomathy,* one-half of which he contributed. His study of Japanese at this time, and the aid of the sailors who taught him, enabled him to make a version in Japanese of the books of Genesis and Matthew. In 1844 he made a journey home by the way of India, Egypt, Palestine, and Italy; and assisted the Presbyterian Board of Missions in plans to secure a full font of Chinese type from matrices cut in Berlin. To raise money for this he gave courses of lectures on China, which were published, New York (2 vols. 1848), as *The Middle Kingdom.* Returning to China 1842, he undertook a new Chinese dictionary, completed 1856, Aug., and published as *The Tonic Dictionary of the Chinese Language in the Canton Dialect.* In 1853-4 he had served as Japanese interpreter in Commodore Perry's two expeditions to Japan; and 1855 he was appointed secretary and interpreter to the U. S. legation in China. His press and more than 7,000 books were burned at the destruction of the foreign factories at Canton 1856, Dec. He resigned, 1857, his connection of 24 years with the American Board, and devoted several years to his great work, *A Syllabic Dictionary of the Chinese Language,* printed and published 1874, at Shanghai. After a visit to America 1875, he took leave of China 1876, after 21 years' service as secretary of legation, with nine periods (amounting to nearly five years) of service as acting U. S. minister. He became professor of Chinese language and literature at Yale University 1877, and died at New Haven. His *Middle Kingdom* appeared, New York, 1883, completely rewritten, enlarged, and revised to date.

WILLIAMS, SETH: soldier: 1822, Mar. 22—1866, Mar. 23; b. Augusta, Me. He graduated at the United States military Academy 1842; served as aide-de-camp to Gen. Robert Patterson during the Mexican war, distinguishing himself at Cerro Gordo; was adjutant of the Military Academy 1850-53; adjutant-general on the staff of Gen. George B. McClellan 1861-2, and of the Army of the Potomac under the three succeeding commanders; and was brevetted colonel for gallantry at Gettysburg. He served as inspector-general of the army on Gen. Grant's staff 1864, Nov., till the close of the war, and was brevetted major-general of volunteers 1864, and brigadier-general and major-general, U. S. A., 1865. He died at Boston.

WILLIAMS, STEPHEN, D.D.: Congregational minister, 1693, May 14—1782, June 10; b. Deerfield, Mass.; son of John Williams (1644-1729). He was carried into captivity by the Indians with his father's family, was redeemed by the governor of Canada after 14 months, and sent to Boston 1705, Nov. His account of his captivity is appended to the *Biographical Memoir of Rev.*

John Williams. He graduated at Harvard College 1713; was ordained to the ministry, and was pastor at Long Meadow, Mass., 1716, till his death there. He acted as chaplain in Sir William Pepperell's expedition against Louisburg 1745, and in expeditions against the French and Indians 1755 and 6, and aided in establishing a mission among the Housatonic Indians at Stockbridge.

WILLIAMS, THOMAS: soldier: 1815-1862, Aug. 5; b. New York. He graduated at the United States Military Academy 1837; served in Florida two years; was assistant professor of mathematics at West Point Academy 1840-1; aide-de-camp to Gen. Winfield Scott 1844-50, and distinguished himself at Contreras, Churubusco, and Chapultepec. He served in Florida against the Seminoles 1856-7, and in Utah 1858; was promoted major 1861, May; brigadier-general of volunteers 1861, Sept. He engaged in the North Carolina expedition, and was stationed at Fort Hatteras till 1862, March, when he led a brigade in the Ship Island expedition. In the first attempt to take Vicksburg, he commanded the land forces, and projected a canal to divert the Mississippi from the city. After the failure of this undertaking, he had charge of the defense of Baton Rouge and was killed at the moment of the successful repulse of Gen. Breckinridge.

WILLIAMS, WILLIAM: signer of the Declaration of Independence: 1731, Apr. 18—1811, Aug. 2; b. Lebanon, Conn.; son of the Rev. Solomon Williams. He graduated at Harvard 1747; studied theology; was with Col. Ephraim Williams (founder of Williams College) on the expedition that started for Canada 1755; held the office of town-clerk of Lebanon 45 years, and representative in the colonial and state assemblies more than 50 years, often chosen as clerk or to preside, and was colonel of militia. He was elected to congress 1776 and 83. He sacrificed much of his property and time to sustain the army, encouraging enlistments, and giving up his house as transient or winter quarters to the troops. Among other offices held by him was membership in the Connecticut committee of correspondence and in the council of safety; and judgeship in the county court and the probate court, the latter for forty years. In 1787 he was prominent in the state convention, urging adoption of the United States constitution. He died in Lebanon.

WILLIAMS, Sir WILLIAM FENWICK, D.C.L.: British soldier, known as the hero of Kars in the Crimean war: 1800, Dec. 4—1883, July 26; b. in Annapolis Royal, Nova Scotia. He graduated at the Military Academy, Woolwich, England, 1821; served in Ceylon as army engineer; rose to captaincy 1840; was commissioner at Erzeroum on the boundary question between Turkey and Persia; and was promoted lieutenant-colonel 1848, and, by the sultan, lieutenant-general with the title William Pasha 1855, when he was sent to relieve Kars (100 m. s.e. of

the Black Sea), besieged by the Russians. He defended the city many months, defeated General Mouravieff outside the city, but was compelled finally to capitulate. He was knighted by the queen, received thanks and pension from parliament, of which he was a member 1857-59; and was made commander-in-chief of forces in British North America 1859, administering the government in Canada 1860 and Nova Scotia 1865, in the absence of governors. He was for a while lieutenant-governor of Nova Scotia, and later, 1868, having been promoted general, was governor-general of Gibraltar 1870-75. Retiring 1877, he was constable of the Tower until his death in London.

WILLIAMSBURG: town, county-seat of Whitley co., Ky.; on the Cumberland river, and on the Louisville and Nashville railroad; about 95 m. s. by e. of Lexington. It is in an agricultural and coal-mining region. It has flour and lumber mills and large coal yards. It has one bank. Pop. 1,525.

WILLIAMSBURG: city, county-seat of James City co., Va.; on the Chesapeake and Ohio railroad; about 48 m. s.e. of Richmond. It is the oldest incorporated town in the state. It was established in 1632, and prior to the revolution it was the capital of the province. It was also the state capital until 1779. It has many historic associations connected with the pre-revolutionary days and the civil war. It is the seat of William and Mary College, and it has the Eastern lunatic asylum, opened in 1773, the oldest institution of its kind in the United States. On May 3, 1862, it was occupied by the Confederate forces, who had withdrawn from Yorktown, and three days later an attack was made by the Union forces. The battle lasted all day. Pop. (1910) 2,044.

WILLIAMSBURG, Battle of: 1862, May 5; at Williamsburg, Va.: between a Union force under the immediate command of Gen. Sumner and a Confederate force under Gen. Johnston. It was the first serious engagement in McClellan's Peninsular campaign of that year, and was a sequel to the unexpected evacuation of Yorktown by the Confederates (May 4) two days before the time fixed by McClellan for terminating the siege of the place by bombardment and assault. The moment the evacuation was discovered, a large force of cav. and artil. with heavy inf. support, was ordered in pursuit. The advance (Stoneman) found the Confederates intrenched 2 m. e. of Williamsburg, and there awaited the support, while Johnston hastily marched to a stronger position in front of the city. Hooker reached Stoneman during the night (May 4-5), and attacking early in the morning, silenced the guns of Fort Magruder. The Confederates, reinforced, made a series of counter-attacks on Hooker, who held his ground till 4:30 P. M., when Kearny arrived, drove the enemy back, and allowed

Hooker to withdraw his exhausted men. In the mean time, Peck's brigade repulsed several attacks on Hooker's right, and Hancock took possession of two works on the enemy's right. Hooker called for reinforcements to enable him to advance and take an inner redoubt, but was ordered to fall back to his first position. He obeyed reluctantly and slowly, though facing a superior force which followed him closely. Anticipating a charge by the enemy, he watched his opportunity, suddenly turned his force and delivered several volleys, and then ordered a bayonet charge, in which his pursuers were totally routed and dispersed. This action closed the fighting for the day, and during the night the Confederates retreated. The losses were about equal on both sides. This battle was one of the most brilliant of the war: Hooker showed remarkable skill and staying power, and Hancock's maneuver was equal to anything in the career of that superb commander.

WILLIAMSBURGH: a town which is now included in the *Eastern District* of Brooklyn, N. Y. See BROOKLYN.

WILLIAMS COLLEGE: second in order of founding of higher institutions of learning in Mass.; at Williamstown, Berkshire co., in the extreme n.w. corner of the state, contiguous to N. Y. and to Vt. The town and college were named after Col. Ephraim Williams, who died 1755, in a battle with Indians and French, leaving by will a small sum of money to found a free school. The growth of the fund for about 30 years, with subscriptions in addition, and the avails of a lottery authorized by the state, secured the erection of a building, now West College, 1790, and the opening of a school 1791; and four advanced students in this school, graduated 1795, were counted as the first college class, the legislature having granted a college charter 1792, and given $4,000 to buy books and apparatus. The Rev. Ebenezer Fitch (1756-1833; b. Conn.: graduate of Yale) was the first pres., 1793-1815, aided during his 21 years by professors of French, of mathematics and nat. philosopy, and of law, and by tutors—39 instructors in all serving under him. The state gave the college lands, which were sold for $10,000, and the proceeds used to erect East College 1797. There were 460 graduates for the 21 years under Pres. Fitch, an annual average of 22. A notable incident of this period was the start given by five of the students, 1806, to foreign mission work. The second pres., Zephaniah S. Moore, D.D. (1770-1823; b. Mass.; Dartmouth graduate and prof.), served six years, 1815-21; he became very unpopular by his advocacy of a removal of the college to Hampshire co., and having resigned in consequence, became the first pres. of Amherst College. Under the third pres., Edward Dorr Griffin, D.D., grandly successful service was rendered 1821-36; and the high Williams ideal of religious

consecration, solid learning, and a broadly useful life, was permanently established. A fine new building, now Griffin Hall, was erected for a chapel, at a cost of $25,000. Chairs of Greek and Latin, of moral philosophy and rhetoric, of nat. history, and of chemistry, were established. There were 311 graduates during the 15 years, of whom 148 entered the ministry.

The fourth pres., Mark Hopkins, M.D., D.D., LL.D., Williams graduate of 1824, carried the college to very high rank 1836-72, by a union of character, intellect, and moral influence rarely seen. There were 1,491 graduates under him; and after resigning the presidency he continued 15 years longer as teacher of moral and intellectual philosophy, and could say 1886 that he had had 2,229 students under his charge. The observatory, secured by his brother, Prof. Albert Hopkins, 1837, was the first in this country of college observatories applied wholly to astronomy. After the burning of East College, 1841, Oct. 17, the present East and South colleges were built 1842. Lawrence Hall, for library, followed 1846; Kellogg Hall 1847, for recitation-rooms and dormitory; Jackson Hall 1855, for nat. history; a president's residence 1858; a stone chapel and an alumni hall 1859; and Goodrich Hall 1865, for gymnasium, and for chemistry and physics. The state gave the college $75,000 during the war time of high prices, on condition that an equal sum should be raised in addition—a task accomplished by President Hopkins.

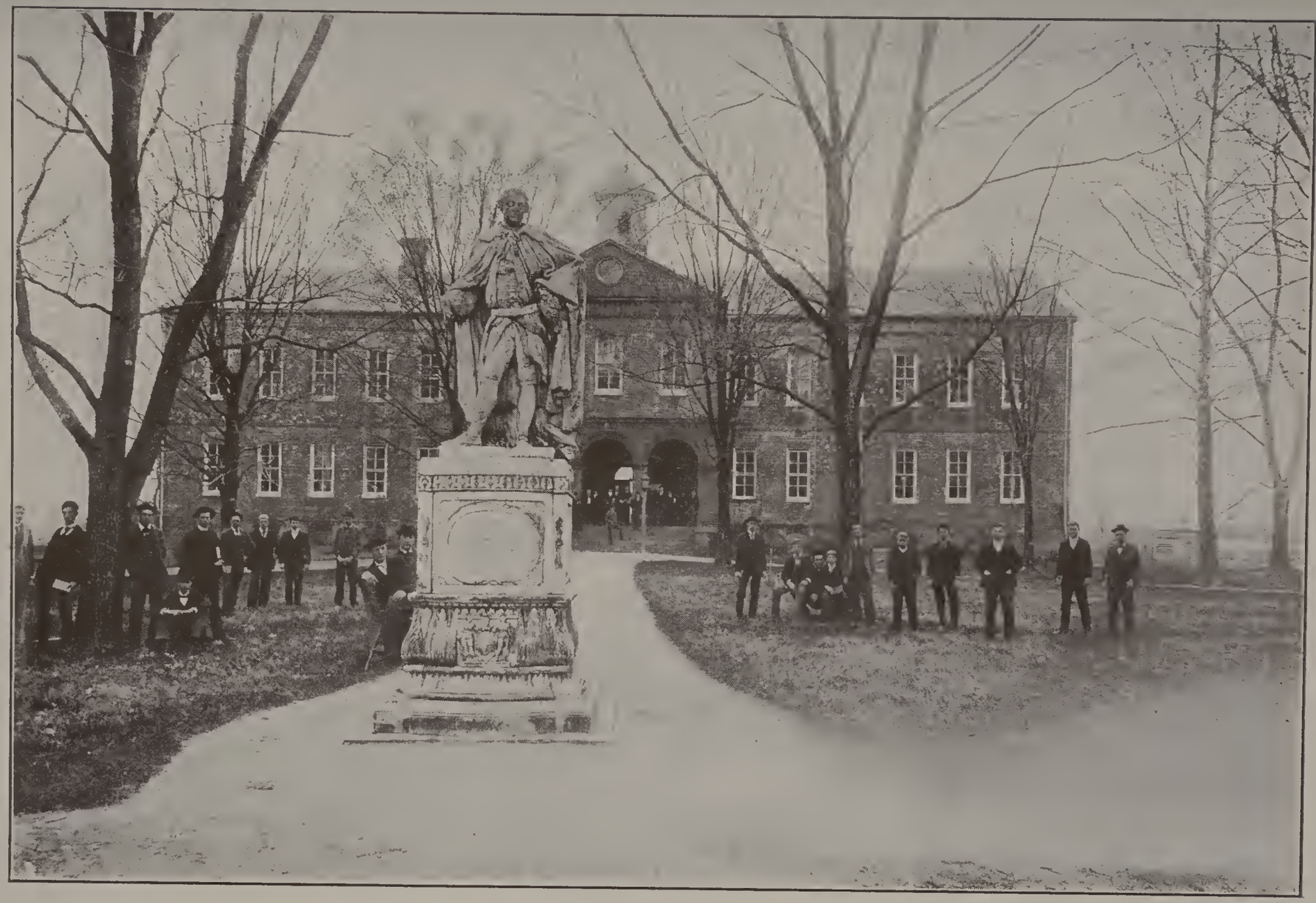
On the resignation of Dr. Hopkins Prof. Paul A. Chadbourne, D.D., LL.D., became president, serving 1872-81 and at his withdrawal, Prof. Franklin Carter, LL.D. (b. Conn., 1837), a Williams graduate, then professor at Yale, but earlier (1863-72) at Williams, took the presidency, which he held till 1901, when he resigned. In 1902 he was succeeded by Henry Hopkins, D.D., LL.D., son of Pres. Mark Hopkins, and long a trustee of the college, who in turn was succeeded by Harry A. Garfield in 1908. College Hall was built 1872, for dining-halls and dormitory; Clark Hall 1882, for a cabinet of minerals; the Field Memorial Observatory and Morgan Hall, for a dormitory, 1882; the new Lasell Gymnasium 1883-85; the Mark Hopkins Memorial Building, and additions to the library building, 1889; and 1891 was begun the first of three new laboratories by F. W. Thompson, of New York, value $100,000. The funds added to the resources of the college under President Carter amount to $1,000,000. A distinction of Williams is that it does not aim to be a university, and does not adopt the new method of many courses and wide election of studies, but remains simply a college definitely aiming at the best college results. There are 57 instructors, 485 students, 62,000 vols. in library, 4,963 graduates since organization, 2,417 living alumni.

WILLIAMSON, Alexander William: English chemist and educator: b. Wandsworth, Surrey, 1824, May 1. He was educated at Paris, Heidelberg, and Giessen, in 1849 was appointed professor of practical chemistry at University College, London, and in 1875 he accepted the chair of chemistry also, occupying both chairs until 1887, when he resigned and was appointed professor emeritus. He has made important researches on etherification, gas analysis, the atomic theory, etc., and has written several important papers concerning his investigations, including *Etherification and the Constitution of Salts,* which attracted widespread notice. He also published *Chemistry for Students.* He is a member of different English and foreign scientific societies, and has been president of the Chemical Society and of the British Association.

WILLIAMSON, Francis John: English sculptor: b. Hampstead, Eng., 1833, July 17. He was a pupil of J. H. Foley and later became his assistant, afterward settling at Esher, Surrey, where he has since lived. He has executed many ideal and private commissions, including portraits of the royal family at the order of Queen Victoria. Among his works are statues of Queen Victoria in Australia, India, Ireland, London, etc.; Dean Milman in Saint Paul's Cathedral; and numerous public statues in different parts of the British Isles.

WILLIAMSON, *wĭl'yam-son,* Hugh, M.D., LL.D.: miscellaneous writer: 1735, Dec. 5—1819, May 22; b. West Nottingham, Penn. He was graduated at the College of Philadelphia (now Univ. of Pennsylvania), 1757; studied theology and preached several years; was professor of mathematics in his college 1760-63; studied medicine in Europe; practiced in Philadelphia; solicited aid in the West Indies and Europe for the Newark Academy, Delaware; was a merchant in Charleston, S. C., and physician Edenton, N. C.; a member of the North Carolina assembly 1782, of congress 1784-86, of the United States constitutional convention 1787, of the North Carolina convention 1789, and of congress 1790-93; then removed to New York, where he died. He was one of the American Philosophical Society commission to observe the transits of Venus and Mercury 1769; was questioned by the privy council in London 1774 on the Boston tea destruction; acted as surgeon to the North Carolina militia 1780-82; helped form the Literature and Philosophical Society in New York 1814, and promoted other institutions. He published papers on transits, currency, canals, comets, climate, history, etc., and an imperfect *History of North Carolina* (1812).

WILLIAMSON, James Alexander: soldier; b. Adair co., Ky., 1829, Feb. 8; d. 1902, Sept. 7. He studied at Knox Coll., Ill., became a lawyer, and entered military service as lieutenant in the 4th Iowa regiment of in-



COLLEGE OF WILLIAM AND MARY, WILLIAMSBURG, VA.

fantry. For gallantry at Pea Ridge, he was made lieut.-col., and soon afterward colonel. He led an assault near Vicksburg, 1862, Dec. 28, and was dangerously wounded. After the capitulation of Vicksburg, he was in constant service as brigade or division commander. On the taking of Savannah, he was commissioned brig.-gen. of volunteers, 1865, Jan., and in March brevetted maj.-gen. Subsequently he was in command of the district of Missouri, and on inspection duty on the upper Missouri river. In 1865, Oct., he returned to the practice of law, was commissioner of the land office 1876-81, and chairman of the public lands commission. He was twice chosen chairman of the Iowa delegates to national republican conventions. For some years General Williamson was in the legal service of a railroad.

WILLIAMSPORT, Ind.: city, county-seat of Warren co.; on the Wabash river and the Wabash railroad; 71 m. n.w. of Indianapolis. It was founded in 1827. It is the trade centre of an agricultural region, and is also situated within 3 m. of large coal mines; it has a building-stone quarry, grist-mills and warehouses; and two state banks. There is a high school founded in 1884. Pop. 1,300.

WILLIAMSPORT, Md.: town in Washington co.; on the Potomac river, the Chesapeake & Ohio canal, and the Cumberland Valley and West Maryland railroads; 65 m. n.w. of Washington. It was founded in 1787; in 1863 Lee's army crossed the Potomac at this point on the march to Gettysburg. It is situated in an agricultural and timber region, and carries on a considerable trade. It has flour and lumber mills and sash and door factories; and a national bank. There is a high school, and several elementary schools, including one for colored pupils. Pop. 1,500.

WILLIAMSPORT: city, cap. of Lycoming co., Penn.; on the Susquehanna river, and on the Northern Central, the Beech Creek, the Pennsylvania, and the Philadelphia & Reading railroads; 94 m. n. of Harrisburg, 200 m. n.w. of Philadelphia. It is tastefully laid out on a plain at the foot of picturesque hills; is supplied with mountain-spring water, gas and electric light plants, and street railroad service; has stone and wood paved streets; and is widely known for its large lumber interests. Williamsport is the greatest timber market in the state, possessing a 'boom' with a carrying capacity of 3,000,000 ft. Coaling and iron and steel manufactures are among the leading industries. There are many large lumber mills in Williamsport, other factories specialize the construction of engines and boilers, agricultural implements, wire rope, fire engines, wood-working machinery, furniture, sewing machines, band instruments, leather, boots and shoes, silk, rubber goods, glassware, rope, nails and wood alcohol.

The city contains upward of 40 churches, several high, grammar and primary schools, Dickinson seminary, public libraries, and numerous large public buildings and institutions, including the Federal building, Y. M. C. A. building, City Hall, Opera House, Women's Christian Home, City hospital, Home for the Friendless, Masonic Temple and several public parks and fair grounds. Ross and Brandor parks are large and admirably kept. There are two race-tracks in Williamsport. Several national, state and private banks are maintained, with large capital. There are daily, semi-weekly, weekly and monthly periodicals. Among the buildings of note are Dickinson Seminary, Y. M. C. A. hall and library, and the Womens' Christian Home. Williamsport became the county-seat on the organization of the county 1795, and a city 1861. Pop. (1900) 28,757. (1910) 31,860.

WIL'LIAMSTOWN, Australia: a seaport in Victoria, on the s.w. shore of Hobson's Bay, immediately opposite Port Melbourne, and 9¼ m. s.w. of Melbourne. The business interests of the town largely centre in the shipping. The piers are commodious, and there are shipbuilding yards, patent slips, and a drydock called the Alfred Graving Dock, opened in 1874 and improved in 1897-8. The chief buildings are the churches, the mechanics' institute, the custom-house, the sailors' rest, banks and similar buildings, etc. Basalt and brown coal are worked near the town, and several manufactures are carried on. Pop. (1901) 14,083.

WILLIAMSTOWN, Mass.: town in Berkshire co.; on the Hoosac and Green rivers, and on the Fitchburg (Boston & Maine) railroad; about 5 m. w. of North Adams and 40 m. east of Troy, N. Y. It was settled in 1753 and was named West Hoosic. In 1765 it was incorporated and the name was changed to Williamstown in honor of Ephraim Williams. In 1793 Williams College was opened, since when it has been a favorite residential town. There are five villages within the town limits. The chief industrial establishments are a cotton mill, a large bleachery, and large freight yards. Market gardening is carired on to quite an extent. There are two banks, one national and one state. Pop. (1900) 5,013; (1910) 3,708.

WIL'LIBRORD, or WIL'LIBRORD, or WIL'BRORD, SAINT: first bishop of Utrecht, commonly styled the 'apostle of the Frisians': about 657-738, Nov. 6; b. in Northumbria. He was educated in the monastery of Ripon, where he received the tonsure, but, like most of the monks of that age, he was sent for final instructions to the schools of Ireland. After a sojourn there of 13 years, he devoted himself to the conversion of Friesland, in which some of his fellow-monks had already engaged with little success. In 690 he sailed with 12 companions; and passing up the Rhine, arrived at Ultra-

jectum, the present Utrecht, soon after the victory of Pepin over the Frisians. Pepin cordially received the missionaries; and Willibrord, having established the beginnings of his mission, went to Rome 692, whence he returned with the sanction of Pope Sergius I., and continued his labor till 695, when he again visited Rome, and received episcopal consecration, with the pallium of an archbishop, 696. Fixing his see at Utrecht, he converted a large number of the inhabitants, and extended his missionary colonies from that centre as far as the Danish provinces, and though he received some check at the death of Pepin 714, yet the successes of Charles Martel enabled him soon to resume, under similar favorable auspices, the work which, after many alterations, ended in the successful establishment of Christianity. Willibrord died at the monastery which he had founded at Echternach, near Treves. His festival is Nov. 7.

WILLIMANTIC, *wĭl-ĭ măn'tik:* a city in Windham co., Conn.; on the Willimantic river, and on the Central Vermont, the New York, New Haven and Hartford, and the New York and New England railroads; 32 m. e.-by-s. of Hartford, 86 m. s.w. of Boston. The river here falls 100 ft. in 1 m., affording excellent water-power, utilized by notable establishments for manufacturing cotton and silk thread, cotton warp, prints, spools, foundry and machine shop products and silk manufacturing machinery and cotton and silk goods, tin and wire ware. Willimantic is laid out with broad streets and concrete sidewalks, and has gas and electric lights, nat. banks, savings banks, loan and trust company, weekly newspapers, a State Normal school, high school, graded and parish schools, public libraries and several banks. Pop. (1900) 8,937; (1910) 11,230.

WILLING, *wĭl'ĭng,* THOMAS: first president of the Bank of the United States: 1731, Dec. 19—1821, Jan. 19; b. Philadelphia. He was educated in England, where also he studied law. 1754-93 he was principal partner of the firm of Willing & Morris, merchants and agents for supplies to the revolutionary army and navy. At different times he held almost every kind of justiceship, up to that of the Pennsylvania supreme court; led in movements against British aggressions, and in favor of a congress; was a member of revolutionary committees, also of the colonial assembly, and of congress 1775-6; voted against the Declaration as premature; but, 1780, came to the rescue of the patriot cause by subscribing largely to establish the Pennsylvania Bank as a measure to sustain the war. He was first pres., 1781-2, of the first chartered bank, that of N. America; and first pres. of the United States Bank. He died in Philadelphia.

WILLIS, *wĭl'ĭss,* NATHANIEL PARKERS: author; 1806, Jan. 20—1867, Jan. 20; b. Portland, Me.; son of Nathaniel W. (1780-1870), projector and publisher (1816) of the *Boston Recorder,* one of the earliest weekly re-

ligious newspapers in the world—also founder (1827) of the well-known *Youth's Companion*, said to be the earliest of all papers for children. Willis graduated 1827 at Yale, where he obtained a prize of $50 for a poem. Among his earliest works were *Scriptural Poems*, poetic narrative versions from the Bible; these quickly gained wide popularity. In 1829 he established the *American Monthly Magazine*, afterward merged in the *New York Mirror*, in which he was associated with George P. Morris. In 1830 he visited Europe, and contributed to the *Mirror* his *Pencillings by the Way*. Appointed *attaché* to the American legation at Paris, he had favorable opportunities for observing European society; and after a visit to Greece and Turkey went to England 1835, and was married to a daughter of a British officer, Gen. Stace. While in England, on account of some personal allusions in his writings, he became involved in a quarrel with Capt. Marryat, which led to a bloodless duel. He contributed to the London *New Monthly* his *Inklings of Adventure*, pub. also in three vols.; and 1839 returned to New York, and published a literary paper, *The Corsair*, and *Letters From Under a Bridge*, written at his romantic country-seat near Owego, N. Y., named, in compliment to his wife, Glenmary. To the *Corsair*, William M. Thackeray, then an unknown writer, was a regular contributor. Willis wrote also at this period *Tortesa, the Usurer* and *Bianca Visconti*, dramas; and the descriptions of scenery illustrated in Bartlett's *United States and Canada*. In 1884 he was again engaged with Gen. Morris, editing the *New Mirror*. His wife died, and he revisited Europe, and published *Dashes at Life with a Free Pencil*, 1845; returned to New York 1846; and married a daughter of the Hon. Joseph Grinnell, of Mass.; and with Morris established the *Home Journal* (still a prosperous publication), to which he contributed most of the following works, pub. also in collected form: *People I Have Met; Life Here and There; Hurrygraphs; Memoranda of a Life of Jenny Lind; Fun Jottings; A Health-trip to the Tropics; A Summer Cruise in the Mediterranean; Famous Persons and Places; Out-doors at Idle Wild; The Rag-bag;* etc. Much of this work was done during a long, brave struggle with what appeared to be consumptive disease. Mr. Willis was an observant and thoughtful writer, discursive, fragmentary, picturesque, sprightly, quaint, and exceedingly graceful in both poetry and prose, full of elaborate ease and ingenious spontaneity; though his style was marred by occasional affectations. He was of a very kindly disposition. He edited the *Home Journal* and resided at his romantic highland retreat of Idle Wild, on the Hudson, near Newburgh, until his death.

WILLISTON, *wĭl'ĭs-ton*, SAMUEL: educational benefactor: 1795, June 17—1874, July 18; b. Easthampton,

Mass.; son of the Rev. Payson Williston, Congl. pastor in that town 44 years. His education was interrupted by ill health; and he began to sell cloth-buttons made by his wife and assistants, the first manufactured in this country. Joel Hayden, of a neighboring town, invented machinery for the work, and went into partnership with Williston, who acquired large wealth in this and other manufactures. Besides giving freely to many objects, he founded 1840 the high-class preparatory school at Easthampton (Williston Seminary), his entire gifts to which were $770,000. To Amherst Coll. he gave $150,000, and much to Mt. Holyoke Seminary. His benefactions have been estimated at $1,500,000. He died in Easthampton.

WILLMAR, Minn.: village, county-seat of Kandiyohi co.; on Foot Lake and on two branches of the Great Northern railroad; about 95 m. w.-by-n. of Minneapolis. The village was founded in 1868. It is in an agricultural and stock-raising region and has a large trade in grain, hay, dairy products, and live stock. It has nine churches, a high school and graded schools. The three banks, one national and two state, have a combined capital of $40,000. Pop. 3,300.

WILLOPAH: an Athabascan tribe of North American Indians who formerly occupied the territory drained by the upper waters of Chehalis river and its tributaries in s.w. Washington. They ceded their lands to the United States in 1864, when but few of them remained.

WILL'-O'-THE-WISP, or WILL'-WITH-A-WISP. See IGNIS-FATUUS.

WILLOUGHBY, *wĭl'ō-bĭ*, LAKE: lake in n. Vt., about 24 m. n. of St. Johnsbury; in the tp. of Westmore, Orleans co.; 7 m. long, 2 m. wide, and very deep. It lies between two mountains, of which the highest, Willoughby Mountain, rises about 3,800 ft. above sea-level, and has many rare plants, and presents a fine view from its summit. The lake is an attractive summer resort.

WILLOUGHBY, Sir HUGH: English Arctic explorer: b. probably Risby, Derbyshire, about 1500; d. about 1554. In 1553 he was appointed to command an expedition fitted out by London merchants 'for the discovery of regions, dominions, islands, and places unknown,' and on May 10 sailed from Deptford with three vessels, the *Bona Esperanza,* his own ship, with 35 persons; the *Edward Bonaventure,* carrying 50 men; and the *Bona Confidentia,* with 28 men. They sighted the coast of Norway about the middle of July and during a storm in the middle of September the *Edward Bonaventure,* at Senjen, parted company with the two other vessels, which reached Russian Lapland, where they found a good harbor at the mouth of the river Arzina. Here Willoughby and his 62 companions perished during the

course of the winter. The following year Russian fishermen found the ships with the dead bodies of the crews, together with commander's journal, and a will witnessed by Willoughby, showing that some of the mariners were alive in January, 1554. Chancellor, after being separated from his comrades, finally reached Archangel, near the mouth of the river Dwina, in the White Sea. News of his arrival was immediately despatched to the Czar Ivan Vasilievitch, who invited the mariners to the court of Moscow. A direct trade with Russia resulted from Chancellor's discovery.

WILLOUGHBY, Westel Woodbury, ph.d.: American publicist: b. Alexandria, Va., 1867, July 20. He was graduated from Johns Hopkins University in 1888 and for several years practiced law in the District of Columbia. He is professor of political science in Johns Hopkins University. He has published: *The Supreme Court of the United States: Its History and Administrative Importance* (1890); *Government and Administration of the United States* (1891); *The Nature of the State* (1896); *Rights and Duties of American Citizenship* (1898); *Social Justice* (1900); *The Political Theories of the Ancient World* (1903); *The American Constitutional System* (1904); etc. He has also edited *The American State Series,* is co-editor of the *Johns Hopkins University Studies in Historical and Political Science,* and managing editor of the *American Political Science Review.*

WILLOUGHBY, William Franklin, American economist, twin brother of Westel Willoughby (q.v.): b. Alexandria, Va., 1867, July 20. He was graduated at Johns Hopkins University in 1888; was expert in the United States Department of Labor 1890-1900; and in 1900 was made special agent on education and social economy of the United States Commission to the Paris Exposition. He has several times represented the Department of Labor at international congresses for the investigation of labor conditions in Europe; is a member of the American Economic Society, a fellow of the Royal and American Statistical societies, and a lecturer on economics at Johns Hopkins; since 1901 has been treasurer of Porto Rico and since 1907 president of the executive council of its legislative assembly. He published *Workingman's Insurance* (1898); *Territories and Dependencies of the United States* in *American State Series* (1905); etc.

WILLOW, n. *wĭl'lō* [AS. *welig;* Dut. *wilg;* Low Ger. *wilge,* a willow]: a plant growing freely in a moist soil; the name for various species of *Salix,* ord. *Salicācĕæ. S. Babylonĭca* is the weeping willow; hence, the *willow,* as in the phrase 'to wear the *willow,*' has been regarded as a token of sorrow or mourning. Wil'lowed, a. *-lōd,* abounding in willows. Wil'lowy, a. *-lō-ĭ,* abounding in

willows; resembling the willow; having a drooping form. WIL'LOW-HERB, a plant growing in moist places; the *Epilobium angus'tifolium*, ord. *Onagrăcĕæ* (see EPILOBIUM).

WILLOW: a genus of trees and shrubs (*Salix*) of the order *Salicaceæ*. The species, of which more than 150 have been described, are natives mostly of the North Temperate zone, but a few are indigenous in the tropics and in the South Temperate zone, and some are found close to the limit of perpetual snow in the Arctic zone and upon lofty mountains, where they are reduced very greatly in stature, etc. One of these last, a European species (*S. herbacea*), rarely exceeds an inch in height. Willows are characterized by simple, usually lanceolate leaves, which in the bud are surrounded by a single bud-scale, flowers naked diœcious, in catkins, followed by dehiscent fruits containing little appendaged seeds which usually float readily with the breeze. In general, the species are best adapted to wet ground, along streams, etc., and on this account are frequently planted to dry out damp ground and for improving the sanitary conditions around cess-pools. Like the Australian gum-trees, which are similarly used, they transpire immense quantities of water. Some of the species are of importance along streams and lakes, where they prevent the washing of the soil either by current or wave. In pleasure grounds, summer resorts, etc., they are often planted because they will thrive almost anywhere and also because they quickly produce an effect. In such capacity, however, they should be used more as temporary than as permanent trees and should be replaced by better, sturdier trees, such as maples, elms, beeches, and others of slower growth. Some of the species of their varieties produce pleasing effects during winter because of their yellow or red branches; in spring by their yellow catkins, or their weeping habits. Willow wood is white, light, soft, porous, generally durable in water. It is used for turning, cabinet work, fuel, and for charcoal-making. The charcoal is highly valued for making crayons and gunpowder. The trees are widely planted in Europe for pollarding, to supply fuel, poles, etc.

The most important industry connected with willows is the growing of osiers for making baskets, wickerwork, etc. The species popularly used in Europe, where the industry is very important, are: the common osier (*S. viminalis*), which yields general purpose rods; fine basket osier (*S. purpurea*); green-leaved osier or ornard (*S. triandra*); golden, or white osier, or willow (*S. alba*); and varieties of these. In America the climate is considered unfavorable to some of the European species and so native species and varieties are more popular. Propagation for osier culture is always by means of cuttings, which are either pieces of branches or single-eye

cuttings. The former are made about 15 inches long, planted 15 to 18 inches asunder in rows from 18 to 24 inches apart; the latter are planted very close together so as to produce attenuated shoots of small diameter. The cuttings are planted preferably upon alluvial soils since such produce the finest rods, and will continue profitable much longer than plantations on lighter soils. On light soils the useful age ranges from 15 to 20 years. Plantations are not made upon clay soils since such give unsatisfactory results.

Having been planted the only attention usually given is an occasional shallow cultivation to destroy weeds. After the leaves have fallen the harvest is made, the rods graded, those for brown baskets dried and piled under cover; those for white baskets tied in bundles, placed upright in shallow trenches containing about 3 inches of water until growth starts in the spring when they are peeled by means of a 'break.' In unfavorable seasons they may require a sort of fermentive process under litter to loosen the bark. The osier industry of Holland, Belgium, France, and England is very extensive. It is mainly confined to low grounds flooded by the tide. In the United States the leading regions of osier culture are western New York, and southeastern Michigan; lesser areas exist near Baltimore, Md., Milwaukee, Wis., and Cincinnati, O. The annual production of baskets in the United States is estimated at approximately $4,000,000.

Among the American species the yellow willow (*S. vitellina*), which is common in the east, is probably the largest and best known. It approaches in size and habit the Huntingdon willow, with which it was formerly united by botanists. The black willow (*S. nigra*) is also indigenous in the east. It grows about 35 ft. tall, and is noted for its rapid distribution along streams into which its brittle twigs fall as they are broken off by every strong wind, and carried far away by the current before they lodge and take root.

A very large number of insects feed upon the willow; 223 have been enumerated by Packard as found in America; in Europe 386 have been recorded. Among these are several species of plant-lice, gall-mites, and scale insects. The larvæ of two longicorn beetles bore in the trunk and branches, and a twig-boring larva, the willow-shoot horntail (*Phyllæcus integer*) bores in the twigs in which the mother deposits her eggs, and in which the pupa state is passed during the winter. The larva of the American cimbex (*Cimbex americana*) which is the largest species of American saw-flies, lives upon the foliage as do also the larvæ of another saw-fly, the yellow spotted willow-slug (*Nematus ventralis*).

WIL'LOW-MOTH (*Caradrina cubicularis*): species of moth, the caterpillars of which feed on the grain of wheat, often doing great mischief. The perfect insect is

of a mouse color, and its wings are closed flat upon its back when it is at rest. On the upper wings are three transverse wavy lines, and some black dots. The under wings are pearly white, with slight tinge of brown near the fringe, and brownish nervures. The body is slender, the antennæ are thread-like. The whole length, without the antennæ, is rather more than half an inch. The caterpillar varies in color from dull ochreous red to dirty green, with blackish head, two brown spots on the first segment, a wavy line on each side edged with black. The caterpillar feeds on grain through the winter, and draws the kernels together with a thin silken web when about to assume the chrysalis state.

WILLOW PATTERN: a design used in the manufacture of stone and porcelain ware, generally executed in dark blue, in imitation of a Chinese design. The name is taken from a willow tree, which is a prominent object in the design.

WIL'LOWS, Cal.: town, county-seat of Glenn co.; on the Southern Pacific railway; about 150 m. n. by e. of San Francisco. In the centre of the town is a grove of willows, the only one in that section, hence the name of the place. The county court-house is a fine building, erected in 1894 at a cost of $150,000. The town ships large quantities of farm products and fruit. It has a state bank. Pop. 900.

WILLOW WREN, or WILLOW WARBLER: a European warbler (*Phylloscopus trochilus*), dull olive-green on the upper part of the body, yellowish-white on the breast and below. The nest is placed on the ground, most commonly against a bank among long grass or weeds, but often at the foot of a bush, and, like that of the wood wren, is covered with a dome having a rather wide hole in the side, whence this species and its congeners are called 'oven birds.' The willow wren is a graceful, active bird, flitting restlessly from twig to twig, and its song is loud and sweet.

WILLS, *wĭlz*, JAMES: founder of Wills Hospital, Philadelphia: 1760-1830; b. England. His fortune was in part by inheritance, in part from his own business in Philadelphia, where he was an honored member of the Society of Friends, and, at his death in that city, left $122,000 to found a hospital for the indigent blind and lame, opened several years later.

WILLS, WILLIAM GORMAN: Irish dramatist; b. Kilmurry, Ireland, 1828, Jan. 28; d. London 1891, Dec. 13. He was educated at Trinity College, Dublin, studied art in the Royal Hibernian Academy, and for a time engaged as a portrait painter. After 1862, however, he devoted himself extensively to literature, though in 1868 he resumed portrait painting. He was the author of *Notice to Quit* (1861); *The Life's Evidence* (1863); and

the dramas *Charles the First* (1872); *Eugene Aram* (1873); *Marie Stuart* (1874); *Jane Shore* (1876); *Olivia* (1878); *Sedgemoor* (1881); *Claudian* (1885); *A Royal Divorce* (1891); etc., and in conjunction with Sidney Grundy, *Madam Pompadour.*

WILLS, William Henry: English writer; b. Plymouth, England, 1810, Jan. 13; d. Welwyn, Hertfordshire, 1880, Sept. 1. He was a member of the original staff of *Punch,* acting as dramatic critic and also contributing both prose and verse. His contributions included: *Natural History of Courtship; Comic Mythology; Information for the People;* etc. In 1846 he became associated with Dickens, with whom he formed a lifelong friendship, as sub-editor of the *Daily News.* In 1849 he became assistant editor of *Household Words* and in 1859 of *All the Year Round.* He published *Old Leaves Gathered from Household Words* (1860).

WILLS, William John: Australian explorer; b. Totnes, Devonshire, 1834, Jan. 5; d. Cooper's Creek, Australia, about 1861, July 1. He studied medicine in London, and in 1852 emigrated to Australia, where he was joined in the following year by his father, and together they practised medicine at Ballarat. In 1855, however, he became a surveyor of crown lands and in 1858 was appointed to the staff of the magnetic and meteorological observatory at Melbourne. In 1860 he joined the expedition under Robert O'Hara Burke as third in command, later becoming second, and crossed the continent northward, reaching the Gulf of Carpentaria, but on the return journey both Burke and Wills died of starvation. Wills' journal was recovered and published: *A Successful Exploration from Melbourne to the Gulf of Carpentaria, from the Letters and Journals of William John Wills* (1863).

WILLSON, Marcius: American educator and author; b. West Stockbridge, Mass., 1813; d. Vineland, N. J., 1905, July 2. He graduated from Union College in 1836, and while studying law, taught school. He was admitted to the bar in 1841, and practiced until an attack of voice trouble precluded public speaking. He was president of Canandaigua Academy (1849-1853), and when Vassar College was founded in 1861, the presidency was offered him but declined owing to his literary engagements. He was the author of numerous standard school books, and in the last 50 years of his life received from his publishers royalties amounting to $250,000. At the time of his death at the age of 91, he was president of the New England Society and a member of the Board of Education. His published works include: *Mosaics of Bible History; Wonderful Story of Old;* and *Principles of Finance and Philosophy of Bimetallism.*

WILLUGHBY, Francis: English ornithologist: b.

Wollaton Hall, Nottinghamshire, 1635; d. 1672, July 3. He studied at Cambridge, where he became the pupil of the famous naturalist, John Ray, and with him made a continental tour (1663-4), making studies and collecting zoological specimens. Ray edited and translated his Latin *Ornithologia* (1676) and in 1678 published it in English as *The Ornithology of Francis Willughby.* Ray also edited Willughby's *History of Fishes* (1686). To the *Ornithologia* Buffon and Linnæus were much indebted, and it is claimed that Willughby originated the Linnæan system of zoological classification.

WILLY NILLY, colloquial phrase, *wĭl'lĭ nĭl'lĭ:* will he or will he not; whether one will or will not.

WIL'MERDING, Pa.; borough in Allegheny co.; on the Pennsylvania railway; 8 m. s.e. of Pittsburg. It was founded in 1859. It was laid out by the Westinghouse Air-brake co., who have here their large manufacturing works. The water supply comes from the Monongahela river; natural gas is used for fuel, and every street is sewered. Pop. (1900) 4,179. (1910) 6,133.

WILMINGTON, *wil'mĭng-ton:* city, port of entry, and cap. of New Castle co., Del.; on the Delaware river and the Brandywine and Christiana creeks; and on the Baltimore, and Ohio, the Philadelphia, Wilmington and Baltimore, and the Wilmington and Northern railroads; 28 m. s.w. of Philadelphia, 70 m. e.n.e. of Baltimore. Both creeks are navigable for vessels drawing 7-14 ft.; city wharves extend along them for 6 m.; and the Brandywine is fringed with mills and factories, to utilize the power afforded by a fall of 120 ft. in the creek within 4 m. of the city. Several regular lines of steamers, passenger and freight, connect with Philadelphia and with the Delaware river and bay, also several Atlantic ports. The city is built mainly between the two creeks, on high ground, which rises by three slopes to 240 ft. above tide water; has wide, straight streets, either parallel with the Christiana or with Market st., which extends the entire length of the city and is the principal business thoroughfare; buildings chiefly of brick; gas and electric light plants; water-works and good drainage. In 1905 the bonded debt was $2,171,400; assessed valuation of real property (personal not assessed) $45,624,891; taxrate $1.50 per $100.

The churches and missions aggregate over 80 edifices and other buildings. The educational facilities are ample, embracing high, grammar and primary schools, a business school, Goldy college, historical, law and other libraries.

There are several national banks and trust companies with deposits exceeding $60,000,000 annually. Wilmington has five public parks. Other educational institutions are the Friends' School for both sexes (opened 1748);

State Normal University (1866); Wesleyan Female College; Rugby Academy for boys; the Delaware Institute for both sexes; and the public library. The manufactures include Pullman and other railroad cars, steel foundry and machine shop products, paper, cotton goods, malleable iron, fibre, furniture, ships and boats, canned meat, pulp, paper-making machinery, carriages and wagons, morocco leather and powder. Wilmington has the largest powder factory in the world.

The census of 1900 showed 759 factories in Wilmington with a capital of $28,372,043. More than 16,000 persons were employed and the value of products exceeded $34,000,000. The U. S. custom-house, post-office, city hall, almshouse, opera-house and several charitable institutions are among notable public buildings. Wilmington was founded 1732, incorporated as a city 1832, and contains a stone church erected by Swedes 1638. Pop. (1900) 76,536; (1910) 87,411.

WIL'MINGTON: city, port of entry, and capital of New Hanover co., N. C.; on Cape Fear river, 30 m. from the ocean, and on the Carolina Central, the Wilmington and South Coast, the Wilmington and Weldon, the Wilmington, Columbia and Augusta, and the Wilmington, Onslow and East Carolina railroads; 134 m. s.s.e. of Raleigh, 189 m. e. of Columbia, S. C. Besides its large railroad connections, it has regular steamboat lines to Baltimore, Philadelphia, and New York, and a large sailing fleet communicating with all parts of the world; hence its foreign and domestic trade is extensive and rapidly increasing. During the year ending 1903, June 30, imports of merchandise aggregated $294,688; exports $14,966,754; cotton exported, 324,568 bales, $14,364,321. Rosin, tar, turpentine, lumber and rice are exported, also. The exports for 1904 from Wilmington were $21,000,000. This city ranks fourth in the state for manufacturing industries. The capital invested in manufactures, 1904, was $5,500,000. There are eight lumber and timber establishments having an annual output of more than $1,000,000 value. The leading manufactures include cotton goods, chemicals, men's clothing, carriages and wagons, hosiery, naval stores, machinery, guano, pine fibre, carpets, fertilizers, creosoting oil, foundry products, flour and rice, shingles and sash and blinds. Excellent rice is grown on two islands opposite the city, inclosed by different channels of the river.

The annual business of the city reaches $40,000,000. There are five banks, more than 40 churches and a full complement of public schools and public institutions, including many charitable organizations. Pop. (1910) 25,748; and 3 daily, 1 weekly, 1 bi-weekly, and 2 semi-monthly periodicals. The notable buildings include U. S. custom-house, U. S. marine hospital, court-house, city hall, seamen's home, and theatre. The city is lighted by gas

and electricity, has adequate water works, and supports a fire dept. with steam-engines and fire alarm. Wilmington was laid out 1733 under the name Newton, and incorporated as a city 1866. During the civil war it was long the principal Confederate port open to blockade-runners.

WILMINGTON, O.: city, county-seat of Clinton co.; on the Cincinnati and Muskingum Valley and the Baltimore and O. railways; about 53 m. n.e. of Cincinnati and 60 m. s.w. of Columbus. It is in an agricultural region. The chief manufacturing establishments are bent-wood and bridge-work factories, furnaces, machine shops, auger bit factory, creameries, and flour and lumber mills. The Wilmington College (Orthodox Friends) was established here in 1870. The two banks have a combined capital of $200,000. Pop. (1910) 4,491.

WILMINGTON COLLEGE: located at Wilmington, O. It was opened to students in 1870, and chartered in 1875, under the auspices of the Society of Friends. It is open to women on equal terms with men. The college organization includes a preparatory school. Two full collegiate courses are offered, the classical, for which Greek is required, leading to the degree of A.B.; and the scientific, leading to the degree of B.S.; a part of the work of the last two years is elective in both courses. A course in bookkeeping is included in the curriculum. The degrees of A.M. or M.S. are conferred for graduate work. There are six county scholarships, and three others; and a student loan fund. The campus consists of 12 acres, and is located in the eastern suburbs of Wilmington. The buildings include the main building, the observatory, South hall (men's dormitory), the women's dormitory, the gymnasium, and the Auditorium. The library contains over 3,000 volumes; the students number 120.

WILMOT, *wĭl'mot*, DAVID: statesman: 1814, Jan. 20—1868, Mar. 16; b. Bethany, Penn. Educated at Bethany and at Aurora, N. Y., he practiced law in Towanda, Penn., and was democratic member of congress 1845-51. In 1846 he moved in congress his famous amendment to a bill appropriating $2,000,000 to negotiate peace with Mexico, and with reference to acquiring a part of her territory; it became known as the Wilmot Proviso, and made a condition of the purchase that 'neither slavery nor involuntary servitude shall ever exist in any part of said territory, except for crime, whereof the party shall first be duly convicted.' This amendment was adopted by the house, but not acted on by the senate; the same result occurred in the next session; and from the fierce discussion sprang the free-soil movement that nominated Martin Van Buren less than two years later. Wilmot was presiding judge of the Penn. 13th district 1853-61, a member of the national republican conventions 1856 and 60, U. S. senator 1861-63, and judge of the U. S.

court of claims 1863 until his death, which occurred in Towanda.

WIL'MOT, JOHN. See ROCHESTER, Earl of.

WILMOT, ROBERT DUNCAN: Canadian statesman; b. Fredericktown, New Brunswick, 1809, Oct. 16; d. Oromocto, New Brunswick, 1891, Feb. 11. He was educated in Saint John, engaged for a time in shipping, and 1846 entered Parliament, where he sat for Saint John until 1861 and again in 1865-7. He was mayor of Saint John in 1849, surveyor-general of New Brunswick, and member of the executive council of the province in 1851-4, provincial secretary in 1856-7, and a delegate to the colonial conference in London, in 1866-7. He became a member of the senate in 1865, of the privy council in 1878, was speaker of the senate in 1878-80, and in 1880-5 was lieutenant-governor of New Brunswick.

WILMOT PROVISO: an amendment offered in the United States congress by David Wilmot (q.v.) 1846, Aug. 8, pending the consideration of a bill placing $2,000,000 at the disposal of President Polk to negotiate a peace with Mexico. The amendment was as follows:

Provided, that, as an express and fundamental condition to the acquisition of any territory from the republic of Mexico by the United States, by virtue of any treaty which may be negotiated between them, and to the use by the executive of the moneys herein appropriated, neither slavery nor involuntary servitude shall ever exist in any part of said territory, except for crime, whereof the party shall first be duly convicted.

It was adopted in the house, and was under debate in the senate when the hour arrived previously fixed for adjournment of the session. At the next session (1847, Feb. 8) Wilmot again introduced it, and a fierce and angry contest began. The house remained firm in favor of the amendment, and it was passed (Feb. 15) by a decided majority, but was not acted on by the senate. It caused great agitation throughout the country. The principal involved long continued to be an important factor in party politics, its influence being affected by many fluctuations of opinion and political action; and it may be said finally to have triumphed through the act of 1862, June 19, forbidding slavery in any of the territories of the United States now existing, or which may at any time hereafter be acquired. Consult: Stephens, *Constitutional View of the Late War Between the States* (1868-70); Wilson, *Rise and Fall of the Slave Power* (1872-7); Schouler, *History of the United States of America Under the Constitution* (new ed. 1899); Von Holst, *Constitutional and Political History of the United States* (new ed. 1899).

WIL'NA. See VILNO.

WILSON, *wil'son*, ALEXANDER: Scottish-American or-

nithologist: 1766, July 6—1813, Aug. 23; b. Paisley, Scotland. He was son of a weaver, and was apprenticed to the weaving trade, at which he worked 7 years, amusing himself by writing verses. As soon as he was free he gratified a roving disposition by shouldering a pedler's pack, and going to Edinburgh to take part in a discussion, in which he maintained the poetic claims of Fergusson against Allan Ramsay. He was prosecuted for a lampoon on a resident of Paisley, and condemned to a short imprisonment, and to burn the libel with his own hand at the Paisley cross. Determined to leave a country where his genius was unappreciated, he sailed from Belfast, and landed at New Castle, Del., 1794, July 14, with a few borrowed shillings in his pocket, and no acquaintances. He got work with a copper-plate-printer in Philadelphia, then with a weaver; travelled as a pedler in New Jersey, where the brilliant plumage of the birds attracted his attention; taught school in Pennsylvania, and later in New Jersey. In the latter state he made the acquaintance of William Bartram, the naturalist; and, stimulated and encouraged by him, Wilson resolved to make a collection of the birds of North America. 1804, Oct., he set out on his first excursion, in which he travelled to Niagara Falls, and wrote *The Forresters, a Poem,* of which, as of his other poetic work, little need be said. In 1805 he learned to etch, and became an assistant editor of *Rees's Cyclopædia.* He soon prevailed on the publisher, Bradford, to undertake an American ornithology. In 1808, Sept., he brought out the first volume, but in a style too costly for the tastes and fortunes of the period, so that he obtained only 41 subscribers in the eastern states, and had no better success in the south. The 2d volume was, notwithstanding, brought out 1810. In 1811 he made a canoe voyage down the Ohio, and travelled overland through the Lower Mississippi valley, from Nashville to New Orleans, collecting specimens for his 3d volume. In his eager pursuit of a rare species, he swam across a river, and caught cold, which ended in his death at Philadelphia. The 8th and 9th volumes were published after his death. The work was continued by Charles Lucien Bonaparte, in 4 volumes (1825-33). A monument was erected to his memory in Paisley Abbey churchyard 1874. Wilson's great work is unrivalled in description, and scarcely rivalled in fidelity of delineation. It is a classic in its department, and a monument of enthusiasm and perseverance.

WIL'SON, Allen Benjamin: inventor of improvements culminating in the Wheeler & Wilson sewing machine: 1824, Oct. 18—1888, Apr. 29; b. Willet, N. Y. While working at his trade of cabinet-making in Pittsfield, Mass., 1849, he devised a sewing-machine which made a stitch with each movement of a double-pointed shuttle, forward and backward. In 1851 he invented a

rotating hook, improving on the lock-stitch and dispensing with a shuttle, and in 1852 a four-motion feed, producing a stitch alike on both sides of the cloth and not liable to unravel. The partnership with Nathaniel Wheeler, begun in Watertown, was removed to Bridgeport, where the factory grew to unusual proportions in this industry, with a productive capacity of nearly 15,000 machines a month. Wilson died in Woodmont, Conn.

WIL'SON, Alpheus Waters, D.D.: Methodist Episcopal bishop: b. Baltimore, 1834. Educated in Baltimore and Washington, he left medical study, and in 1853 began preaching with great acceptance. In 1878 he was chosen secretary of the Southern Methodist Episcopal Board of Missions, and 1882 bishop. He made a tour of the world 1888-9, and in 1898-90, 1907, visited China and Korea. As a speaker and administrator he ranks high. He has published *Influence of Methodism on Other Denominations* (1881, delivered as an address at the ecumenical conference in London); and *Missions* (1882).

WILSON, Augusta Jane Evans: American novelist: b. Columbus, Ga., 1835, May 8. She was married to L. M. Wilson of Mobile in 1868. Her writings include: *Inez, a Tale of the Alamo* (1856); *Beulah,* the most popular of her novels (1859); *Macaria* (1864); *St. Elmo,* parodied by Webb in *St. Twel'mo* (1866); *Vashti* (1869); *Infelice* (1875); *At the Mercy of Tiberius* (1887); *A Speckled Bird* (1902); *Devota* (1907). The earlier books had a great popularity. They attempted to be massive, but contained no permanent elements, though attaining at times some power of expression. The later volume, written in the same manner, did not obtain recognition.

WIL'SON, Daniel, D.D.: English bishop: 1778, July 2—1858, Jan. 2; b. London. Six years an apprentice to a silk manufacturer, he became at the age of 20 a student at Oxford, and three years later was ordained. He was curate 1802; Oxford prize essayist 1803; tutor at St. Edmund's Hall 1804; vice-principal, and curate of Worton, 1807-12, after which he ministered in St. John's Chapel, London, and was vicar of Islington. In 1832 he was consecrated bishop of Calcutta and metropolitan of India. Among his published works are: *Lectures on Christian Character,* on the *Epistle to the Colossians,* on the *Evidences of Christianity; Sermons on India,* on *Christian Doctrine,* on *The Lord's Day;* and *Sufficiency of Scripture as a Rule of Faith.*—See life by the Rev. J. Bateman (1860). The lectures on Christian doctrine, and on the evidences, became widely known as standard works. Bp. Wilson was evangelical in doctrine, devoted in spirit, an unremitting worker, and solid in attainments. His episcopal jurisdiction in-

cluded all India, the island of Ceylon, Australia, New Zealand, and Tasmania, and he administered his charge with zeal and energy for a quarter of a century.

WIL'SON, Sir DANIEL, LL.D.: Scottish-Canadian archæologist and educator: b. Edinburgh, Scotland, 1816, Jan. 5; d. Toronto, 1892, Aug. 7. He was educated at the Univ. of Edinburgh, and was early attracted by antiquarian studies. He had been for some time secretary to the Scottish Society of Antiquaries, when he was appointed, 1853, professor of history and English literature in the University of Toronto, whose prosperity he greatly promoted, and became its president 1881. In 1882 he was named vice-president of the literature section of the Royal Society of Canada, and 1885 became its president. He was knighted by the queen 1888. Among his works are: *Memorials of Edinburgh in the Olden Time* (1848; new ed. 1878); *Oliver Cromwell* (1843); *Archæology and Pre-historic Annals of Scotland* (1851; 2d ed. 1863); *Pre-historic Man: Researches into the Origin of Civilization in the Old World and the New* (2 vols. 1862; enlarged and rewritten, 3d ed. 1876); *Chatterton* (1869); *Caliban: the Missing Link* (1873); a volume of poems called *Spring Flowers* (1875). For four years he edited the journal of the Canadian Institute, of which, 1859 and 60, he was president.

WILSON, FLORENCE: commonly known by the Latinized form of his name, 'FLORENTIUS VOLUSENUS,' Scotch theologian: b. near Elgin about 1500; d. Vienne, Dauphiny, France, 1547. He was educated at King's College, Aberdeen, became a member of the household of the learned Cardinal du Bellay, archbishop of Paris, and was appointed by Cardinal Sadolet master of the public school of Carpentras. Here he wrote his famous dialogue *The Tranquillity of Mind* (1543), much prized for its classical erudition and the beauty of its Latin style.

WILSON, FRANCIS: American actor: b. Philadelphia, Pa., 1854, Feb. 7. He made his first appearance on the stage in a minstrel company, his début in regular comedy occurring at the Chestnut Street Theatre, Philadelphia, in 1877. He played in various parts with much success and made his initial appearance in comic opera as Sir Joseph Porter in *Pinafore*. He later became leading comedian in different New York theatres and afterward organized his own company, himself playing the leading comedy roles. He has published: *The Eugene Field I Knew; Recollections of a Player; Going on the Stage; Joseph Jefferson, Recollections of a Fellow Player.*

WIL'SON, GEORGE, M.D., F.R.S.E.: Scottish chemist: 1818, Feb. 21—1859, Nov. 22: b. Edinburgh; younger brother of Sir Daniel W. He was educated at Edin-

burgh, where he graduated also in medicine, and received a license as lecturer on chemistry from the Royal College of Surgeons 1840. He subsequently became lecturer on chemistry in the School of Arts and in the Veterinary College, and 1855 was appointed professor of technology in Edinburgh University. With this office he held the curatorship of the Industrial Museum. Among his scientific works are: *Text-book on Chemistry* in Chambers's *Educational Course; Researches in Color-Blindness;* and *The Five Gateways of Knowledge.* Other works are: *Life of Cavendish* (1851); *Life of Dr. John Reid* (1852); and, with Mr. Geikie, *Memoir of Edward Forbes* (1861). There are also several poems from his pen. A memoir, illustrating his singularly attractive character, was published by his sister (Mrs. Sime) 1860.

WIL'SON, GEORGE FRANCIS: inventor: 1818, Dec. 7—1883, Jan. 19; b. Uxbridge, Mass. After apprenticeship in a woolen-mill in his native place, he became a student and then a teacher at Shelburne Falls, Mass.; and 1844 opened an academy in Chicago. Four years later he engaged in manufacturing in Providence, R. I., and in 1857 established the Rumford chemical works in connection with Prof. E. N. Horsford, of Cambridge, Mass. Besides improvements in this industry, he made others in the paper manufacture and in light-house illumination. At the same time he made investigations in agriculture; and was elected repeatedly to the legislature. He died in East Providence, bequeathing $50,000 to the scientific department of Dartmouth College and $100,000 to Brown University.

WIL'SON, HENRY: statesman: 1812, Feb. 16—1875, Nov. 22; b. Farmington, N. H.; son of Winthrop and Abigail Colbath, hard-working people, of Scotch-Irish descent, and of character and mind above their lot. The name Henry W. was taken at the age of 21 by change from Jeremiah Jones Colbath. When very young, Wilson was taught reading and arithmetic; and the gift of a New Testament in his 9th year, on condition of his reading it through, as he did in a week, started him as a scholar, who, at 21, had read nearly a thousand volumes, including all the *N. Amer. Review.* From the age of 10 years (1822, Aug. 7—1833, Feb. 16) he served an apprenticeship to a farmer. He migrated to Natick, Mass., 1833, Dec., taking the hundred miles on foot, and going by way of Boston to see Bunker Hill and the *N. Amer. Review* office. Learning shoemaking, he rapidly mastered the tasks and profits of his new trade. Hearing Everett in Lexington, 1835, Apr. 19, and Webster in Boston, and learning to think on his feet in a debating society at Natick, he soon gave evidence of the genius for action and speech which were to make him notable in American statesmanship. A visit to Washington, 1836, May 15—June 15, showed him

facts of slavery which determined his unflinching life-long stand on anti-slavery principle. From July 1, with $700 of earnings in hand, Wilson undertook academy study and winter teaching, five terms in New Hampshire, and one term in Natick in charge of a winter school; and in the spring of 1838, with a capital of $12, he entered for ten years on shoe manufacturing.

The Harrison campaign of 1840 brought him out as an effective political speaker, and with Harrison's election he became a Massachusetts state representative 1841; was elected to the state senate 1844, and again 1845; became representative again 1846; was a supporter of Webster in the whig national convention 1848, June; but bolted Gen. Taylor's nomination and helped start the free-soil party, which nominated Van Buren; was again representative 1850; arranged the coalition which elected Geo. S. Boutwell governor and made Charles Sumner and Robert Rantoul United States senators; 1851 was returned to the state senate and made its pres., and again, 1852, was chairman of the Pittsburgh free-soil convention the same year, and barely failed of election to congress; was defeated 1853 as free-soil candidate for governor; but 1855, acting with the American party, was chosen to the United States senate, where he served 18 years, 1855, Feb. 10—1873, Mar. 3, when, as vice-pres., in Gen. Grant's second term, he rose from the floor of the senate to the chair of its president.

As U. S. senator, Wilson became a foremost leader against compromise with slavery. He boldly predicted, against Senator Douglas, not only the struggle of 1856, but also the anti-slavery victory of 1860. The break-up of the American party, 1855, June, was his work, and he was one of the leaders, in Massachusetts and at Washington, in organizing the new republican party. Re-elected to the senate 1859, Jan., he gave the most energetic support to Abraham Lincoln's candidacy for the presidency 1860; and on the issue of compromise or contest raised by Lincoln's election he unflinchingly opposed, 1861, Feb., Crittenden's measures of compromise. When challenged to a duel by Preston S. Brooks for his denunciation of Brook's assault on Charles Sumner, Wilson declined—stigmatizing duelling as barbarous and unlawful; but announcing that he fully believed in and should exercise the right of self-defense. He was not attacked. When contest began at Fort Sumter, his foresight of 'tremendous conflict' and 'the doom of slavery' was instant, and his advice and action in relation to war bold and energetic. In his own state he had served in the militia nine years, 1843-52, from major to brig.-gen., and shown remarkable military gifts. He now succeeded Jefferson Davis as chairman of the senate military committee, and set in motion that long course of legislative action and army

organization of which the final result was the victory of the Union and the destruction of slavery.

Re-elected to the senate 1865, Feb., Wilson was foremost in efficient garnering of the results of the war, in the conduct of reconstruction, and in securing settled peace. His eminent service to the freedmen, the outcome of a life of ardor for equal liberty, was justly recognized when, in the convention at Philadelphia which renominated President Grant, a close contest for the second place on the ticket terminated in favor of Wilson by the action of a negro delegate, representing Virginia, announcing the 'change of the vote of Virginia to Henry Wilson.' But excessive labor had worn too much upon him to permit his living out the term as vice-pres. to which he was elected 1872, Nov. He suffered successive attacks of paralysis 1873-75, and died in his room at the Capitol, not yet 64 years of age.

He published: *History of the Anti-Slavery Measures of 37th and 38th U. S. Congresses 1861-65* (1865); *Military Measures of the U. S. Congress, 1861-65* (1866); *The History of the Reconstruction Measures of the 39th and 40th Congresses, 1865-68* (1868); and *The History of the Rise and Fall of the Slave-Power in America* (vol I. 1872, II. 1874, III. 1876). His speeches which appeared in print numbered about 1,300.

WILSON, Henry Bristow: English Anglican clergyman: b. London 1803; d. Lee, Kent, 1888, Aug. 10. He was educated at Oxford, took orders in the Church of England and was one of the four Oxford tutors who in 1841 sent a protest to the editor of *Tracts for the Times*. He later became professor of Anglo-Saxon at Oxford, in 1851 vicar of Great Staughton, Huntingdonshire, and was one of the seven clerical authors of the famous volume of *Essays and Reviews* (1860); his contribution being *The National Church*. He was tried for heresy before the court of Arches, but his sentence of a year's suspension from his benefice was reversed by the privy council. He was also the author of *The Communion of Saints: An Attempt to Illustrate the Principles of Church Union* (1851), the Bampton lecture contributed to *Oxford Essays*.

WILSON, Horace Hayman: Sanskrit scholar: 1786, Sep. 26—1860, May 8; b. London, England. He was educated for the medical profession, and 1808 went to India as asst. surgeon on the Bengal establishment of the East India Company, and being proficient in chemistry, soon obtained an appointment in the Calcutta mint as assistant to Dr. Leyden. He now applied himself diligently to the study of Sanskrit, and obtained so high a reputation for scholarship that, 1811, he was appointed sec. of the Asiatic Soc. of Bengal. In 1813 Wilson published his first work, *The Mégha Dúta, or Cloud Messenger, a Poem in the Sanscrit Language, by*

Kâlidâsa; translated into English Verse, with Notes and Illustrations, by H. H. Wilson (Calcutta 1813, reprinted London 1814). His next publication was *A Dictionary, Sanscrit and English, translated, amended, and enlarged from an original Compilation prepared by Learned Natives* (Calcutta 1819-1840)—a work of great advantage to students of Sanskrit. In 1832 the Boden professorship of Sanskrit was founded in the University of Oxford, and Wilson was elected to that lucrative post, not without strong competition. Soon after his arrival in England, he was appointed librarian at the East India House, and held this appointment with the professorship. In 1837 he succeeded Colebrook as director of the Royal Asiatic Society. He was married to a granddaughter of the celebrated Mrs. Siddons. Wilson, as an orientalist, takes rank with Sir W. Jones and H. T. Colebrooke. Many of his researches are embodied in papers contributed to the *Journal of the Asiatic Society of Bengal,* and other periodicals. A collected ed. of his works was published, 12 vols. 1864-70. Among them are: *Select Specimens of the Theatre of the Hindus, translated from the Original Sanscrit, 3 vol.* (Calcutta 1827); *The Raghu Vansa, or Race of Raghu, a Historical Poem, by Kâlidâsa, with a Prose Interpretation of the Text, by Pundits of the Sanscrit College of Calcutta* (1832), edited by Wilson; *The Vishn'u-Purân'a a System of Hindu Mythology, translated from the original Sanscrit, and illustrated by Notes* (Lond. 1840); *An Introduction to the Grammar of the Sanscrit Language* (Lond. 1841); *Ariana Antiqua, a Descriptive Account of the Antiquities and Coins of Afghanistan* (Lond. 1841); *History of British India from 1805 to 1835* (1848); *Rig-Veda-Sanhita, a Collection of Ancient Hindu Hymns, translated from the Original Sanscrit* (1850); *A Glossary of Judicial and Revenue Terms, from the Arabic, Persian, Hindustani,* etc. (1855); *Principles of Hindu and Mohammedan Law, republished from the Principles and Precedents of the Same, by the late Sir William Hay Macnaghten, and edited by H. H. Wilson* (Lond. 1860). Many of these were produced while Wilson held the office of assay-master and secretary of the mint at Calcutta. In his official capacity he often received the thanks of the government of India for reforms in the coinage and other services.

WIL'SON, JAMES, LL.D.: signer of the Declaration of Independence: 1742, Sep. 14—1798, Aug. 28; b. near St. Andrews, Scotland. He was educated in the Universities of Glasgow and Edinburgh; came to this country 1763; was tutor in the College, now University of Pennsylvania, and practiced law in Reading and Carlisle with much success. He wrote much for the patriot cause; was a member of the preliminary conventions 1774-5, and of the continental congresses 1775-77, opposing independence even to the month before the

Declaration, which, however, he was the first of the Penn. members to sign. He was on the most important committees, and 1775 was supt. of one of the three Indian departments. As colonel he had part in the New Jersey campaign of 1776. In 1779 he was advocate-general of the French government, and the same year was mobbed for acting as counsel for tories; in 1782 was commissioned brig.-gen.; and in 1783 and 1785-87 was member of congress, and influential as a federalist in shaping the United States constitution, also in framing that of Pennsylvania 1789-90. He was professor of law in the college at Philadelphia from 1790, and associate justice in the United States supreme court 1789 till his death in Edenton, N. C. His works in 3 vols. were published 1803-4 by his son, the Rev. Bird Wilson. With Thomas McKean, he was author of *Commentaries on the Constitution of the United States* (1792).

WILSON, JAMES: American globe maker: b. Londonderry, N. H., 1763; d. Bradford, Vt., 1855, Mar. 26. Up to the age of 33 he was a farmer in his native place, at the same time reading and studying geography and astronomy. In 1796 he moved to Bradford, Vt., where he began experimenting with balls turned from blocks of wood and covered with paper. This rude beginning was followed by a much better method. The solid balls were thickly covered with layers of paper firmly pasted together, and this shell was then divided into hemispheres, which being removed were again united, and finished with due regard to lightness, strength and smoothness. He procured copper plates of sufficient size for his 13-inch globes, protracted his maps on them in sections, tapering as the degrees of longitude do from the equator to the poles and engraved them with such admirable accuracy of design, that when cut apart and duly pasted on his spheres, the edges with their lines, and even the different parts of the finest letters would perfectly coincide and make one surface, truly representing the earth or celestial constellations. He published his first globes in 1814. When past 80 he constructed a machine which illustrated the daily and yearly revolutions of the earth; the cause of the successive seasons; and the sun's place for every day of the year, in the ecliptic. These movements were produced by turning a crank, which caused the earth to revolve about the sun in the plane of the ecliptic, always retaining its true relative position. For want of a more definite name the machine was called Wilson's Planetarium. The large copper plate, on which are printed the months of the year, with their days, and the corresponding signs of the zodiac with their degrees, was engraved by Wilson after he was 83 years of age.

WILSON, JAMES, LL.D.: American politician: b. Ayreshire, Scotland, 1835, Aug. 16. He came with his par-

ents to the United States in 1852, and settled in Iowa in 1855. He was educated at Iowa College, engaged in farming in 1861, and in that year was elected to the state legislature, where he served for three terms, acting as speaker for the last two years. He was a member of Congress in 1872-7, state railway commissioner in 1877-83, and in 1883-5 was again a member of Congress. He was a regent of the State University in 1870-4, and in 1890-7 was director of the Agricultural Experiment Station and professor of agriculture at the Iowa Agricultural College, Ames, Iowa. He was appointed secretary of agriculture by President McKinley in 1897, was reappointed in 1901, and retained in office by President Roosevelt upon his accession to the presidency and remained in the same position under President Taft. His term of office was longer than any other cabinet officer.

WILSON, James F.: American politician: b. Newark, O., 1828, Oct. 19; d. Fairfield, Ia., 1895, Apr. 22. He studied law, settled at Fairfield, Ia., in 1853, was elected to the convention for a revision of the state constitution in 1856, sat in both houses of the state legislature, and was president of the senate in 1861. From 1861 to 1869 he was a member of Congress, where he was chairman of the judiciary committee and one of the managers of the impeachment of Andrew Johnson. In 1883 he was elected to the United States Senate, and in 1889 re-elected. He was made a commissioner for the Pacific railway.

WILSON, James Grant, d.c.l., ll.d.: American author: b. Edinburgh, Scotland, 1832, Apr. 28. He was brought to this country in infancy by his father, William Wilson, served in the Union army during the Civil War, and reached the rank of brigadier-general. After the war he settled in New York and has been president of the New York Genealogical and Biographical Society from 1884. Among his numerous publications are: *Biographical Sketches of Illinois Officers* (1862-3); *Love in Letters, Illustrated in the Correspondence of Eminent Persons* (1867); *Life of Fitz-Greene Halleck* (1869); *Sketches of Illustrious Soldiers* (1874); *Poets and Poetry of Scotland* (1876); *Centennial History of the Diocese of New York 1775-1885* (1886); *Bryant and His Friends* (1886); *Commodore Isaac Hull and the Frigate Constitution* (1889); *Life of General Grant* (1897); *The Presidents of the United States* (1901); *Thackeray in the United States* (1903). He was the editor (with John Fiske) of *Appleton's Cyclopædia of American Biography* (6 vols. 1886-9), and alone, of *Memorial History of the City of New York* (1892-3).

WILSON, James Harrison, ll.d.: American soldier: b. near Shawneetown, Ill., 1837, Sept. 2. He was graduated from West Point in 1860, was promoted lieutenant

in 1861, and was chief topographical engineer on the Port Royal expedition. He was brevetted major for conduct at Fort Pulaski, Ga., and subsequently was aide-de-camp to General McClellan, participating in the battles of Antietam and South Mountain. In the campaign against Richmond and in the operations against Chattanooga and Knoxville he was assistant engineer and inspector-general of the Army of Tennessee, and in 1863 was made brigadier-general of volunteers, and brevet lieutenant-colonel of regulars for gallantry at Chattanooga. He was brevetted colonel for conduct at the battle of the Wilderness, and was engaged in the siege of Petersburg and in the Shenandoah campaign. In 1864, Sept., he was transferred to the command of the cavalry of the Mississippi division, took part in General Thomas' campaign in Tennessee and was conspicuous at the battles of Franklin and Nashville. In 1865, Mar., he made a raid into Alabama and Georgia and in 28 days captured Salem, Montgomery, Columbus, and Macon, taking 6,820 prisoners, among whom was Jefferson Davis. He received brevet rank as brigadier- and major-general and in 1866 was mustered out of the volunteer service. He was appointed lieutenant-colonel in the regular army in that year, but resigned in 1879, and was subsequently engaged in railroad engineering until the outbreak of the Spanish-American war, when he was appointed major-general of volunteers, and was assigned to command a division in Porto Rico. He was retired with the rank of brigadier-general of regulars in 1901. In 1902 he represented the United States army at the coronation of Edward VII. He has published, with C. A. Dana, *Life of General Grant* (1868); *Life of Andrew Alexander* (1887); *China, Travels and Investigations in the Middle Kingdom* (1887-1900), and biographies of Generals W. L. Smith, McCook and Rawlins.

WILSON, John: American colonial clergyman; b. Windsor, England, 1588; d. Boston, Mass., 1667. He was educated at King's College, Cambridge; was made fellow there; studied law, but took orders; was minister of Sudbury, Suffolk; and having frequently been suspended as a Puritan, embarked with John Winthrop for America in 1630 and landed at Salem, Mass. At Charlestown he organized what afterward became the First Church of Boston, of which he was ordained pastor in 1632. He was opposed to the so-called Antinomian heresy of the time; was associated with John Eliot in missionary work among the Indians; and was chaplain to the force sent in 1639 against the Pequots of Connecticut. He published, *Some Helps to Faith* (1625); a poem, *Famous Deliverances of the English Nation* (1626); a Latin poem commemorating John Harvard; and *The Day Breaking, If Not the Sun Rising, of the Gospel* (1647); new ed. (1865).

WILSON, JOHN: Scottish author, best known by his pseudonym 'CHRISTOPHER NORTH'; b. Paisley, 1785, May 18; d. Edinburgh, 1854, Apr. 3. He was educated at Glasgow University and Magdalen College, Oxford, and while at Oxford was noted for his skill in boating, cricketing, and other athletic sports. Having at 21 come into a large fortune, he purchased the property of Elleray, on Windermere, and retired there to live at his ease, writing poetry, and engaging in field sports and occasional wild frolics, to which the exuberance of his animal spirits was ever impelling him. In 1812 he wrote the once-famed *Isle of Palms.* Another poem in dramatic form, *The City of the Plague* (1816), was still more successful; but is now forgotten. Wilson's fame with posterity rests on his prose writings, and more especially his contributions to *Blackwood's Magazine.* Among the numerous papers furnished by Wilson may be mentioned those celebrated ones on fishing, shooting, and kindred pursuits, produced under the well-known sobriquet of 'Christopher North,' and above all his renowned *Noctes Amorosianæ,* a series of conversations on literary and general subjects, supposed to take place at certain convivial meetings held in Ambrose's Tavern by the contributors to the *Magazine* and since reprinted separately. In 1820 he obtained the chair of moral philosophy in the University of Edinburgh, a post he occupied with credit for 32 years. In 1822 to 1824 he published three prose works of fiction, *Lights and Shadows of Scottish Life; The Foresters;* and *The Trials of Margaret Lyndsay,* which are marked by pathos and beauty of description, but are far from being faithful transcripts of human nature, and degenerate at times into mawkish sentimentality. A government pension of £300 per annum was bestowed on him in 1851, and the following year he resigned his professorship. There is an incomplete edition of his works by Ferrier (12 vols., 1855-8), and a separate edition of the *Noctes* by R. S. Mackenzie (5 vols., 1866).

WILSON, JOHN: Scottish missionary; b. Lauder, Scotland, 1804, Dec. 11; d. Bombay, India, 1875, Dec. 1. He was educated at the University of Edinburgh, went to Bombay in the service of the Scottish Missionary Society in 1828, and in 1835 transferred his labors to the mission work of the Free Church of Scotland. He established numerous schools; became vice-chancellor of the University of Bombay; contributed largely to the abolition of the practice of suttee; travelled all over India establishing missionary centers; and was universally honored and beloved by the natives, among whom he spent his life from the time he went among them with the exception of the years 1843-7. He founded in 1830 the *Oriental Christian Spectator,* issued for 30 years, and was the pioneer of Christian periodicals in India. His linguistic ability was remarkable, and his contributions

to literature included: *The Parsi Religion* (1842); *India Three Thousand Years Ago* (1857); *Memoirs on the Cave-Temples of India* (1859); *The Lands of the Bible Visited and Described* (1867); and *Indian Castle* (1877).

WIL'SON, JOHN LEIGHTON, D.D.: Presbyterian missionary: 1809, Mar. 25—1886, July 13; b. in Sumter co., S. C. He graduated at Union Coll. 1829, and Columbia Theological Seminary, S. C.; studied Arabic at Andover; was missionary at Cape Palmas, Africa, 1834-42, and on the Gaboon river 1842-53; and then was compelled by ill health to return to this country. At the former station he reduced to writing the Grebo language, embodied it in grammar and dictionary, translated into it portions of the Bible, and printed several small volumes for native use; at the Gaboon station he accomplished the same work for the Mpongwe language; and in both fields organized a church and a school. In 1854 he was appointed sec. of the Presbyterian foreign mission board, and from the outbreak of the war filled the same office in the Presbyterian Church, South. A pamphlet by him, largely republished in England, prevented the withdrawal of the British squadron from the African coast, and thus secured the suppression of the slave-trade. He was a contributor to theological reviews and the Amer. Oriental Society's journal; and pub. *Western Africa, its History, Condition, and Prospects* (1856). He died at Mayesville, S. C.

WILSON, JOHN MOULDER: American military engineer; b. District of Columbia, 1837, Oct. 8 He was graduated from West Point in 1860, received rank as lieutenant in 1861 and subsequently served in the Manassas, Peninsular, and Maryland campaigns. He was conspicuous for gallantry at Gaines's Mills and at Malvern Hill in 1862, and in 1863 was promoted captain, subsequently serving in the engineer corps. In 1865 he was brevetted colonel of volunteers and both lieutenant-colonel and colonel of regulars for gallantry at the capture of Spanish Fort in Mobile harbor, and at Fort Blakely. After the war he was in charge of various important engineering works under the government and in 1886-9 was superintendent of public buildings and grounds in the District of Columbia. He directed the completion of the Washington Monument, the construction of the Army Medical Museum and Library, and other public buildings and memorials. He was appointed superintendent of the Naval Academy in 1889; in 1897 was appointed chief of engineers with rank of brigadier-general and was retired at his own request in 1901. In 1902 he was appointed to represent the army at the coronation of Edward VII.

WILSON, JOHN TIMOTHY: American organizer: b. Riceville, Tenn., 1861, Jan. 29. He worked on a farm until 17, filled several positions on a railroad and in 1888 began the organization of the International Brotherhood

of Maintenance-of-Way Employees, of which he has been president since its start. It has nearly 100,000 members, has secured increased wages, shorter hours, and improved working conditions, with but one strike on its records. Wilson published *The Calcium Light,* an account of this strike (on the Canadian Pacific, 1901).

WILSON, Richard: Welsh landscape-painter; b. Penegoes, Montgomeryshire, 1714; d. Llanberis, Carnarvonshire, 1782, May. He went to London, and studied portrait-painting with Thomas Wright. He then practised his profession in London, at length went to Italy, and at Venice, Zuccarelli, the artist, persuaded him to devote himself wholly to landscape. After staying some time at Rome and Naples, where he acquired great reputation, he returned to England in 1756, and settled in the metropolis. He had for a while much employment; but was at length doomed to undergo indifference and neglect, and was glad to obtain the office of librarian to the Royal Academy in 1776. His taste was exquisite, and whatever came from his easel bore the stamp of elegance and truth. Among his best works are the *Niobe, Ruins of the Villa of Mæcenas, Phæthon, Snowdon, View of Rome from the Villa Madama.* Two of his works are to be seen in the New York Metropolitan Museum.

WIL'SON, Sir Robert Thomas: English soldier: 1777-1849, May 9; b. London, where his father was a painter. He was educated at Westminster and at Winchester; and when scarcely 17 years old he joined the 15th light dragoons, then serving in Belgium. In 1798 he was engaged in Ireland in the suppression of the rebellion; afterward he served in Egypt, at the Cape of Good Hope, and in the Peninsula under Wellington; and in 1812 he was attached to the Russian army as English milit. commissioner, during the tremendous struggle which resulted in the capture of Moscow and the pursuit of the doomed French army. At Lützen he took command of the Prussian reserve at a particular crisis of the battle. In 1841 he attained the rank of gen.; and 1842-49 he was gov. of Gibraltar. In 1818 he had been returned to parliament in the liberal interest for Southwark, and he retained his seat till 1831. He died suddenly in London.

WIL'SON, Theodore Delevan: naval constructor: 1840, May 11—1896, June 29; b. Brooklyn, N. Y. After apprenticeship in the Brooklyn navy-yard, and three months' service in the 13th N. Y. militia in the civil war, he was engaged at first as carpenter on a blockading vessel, and then as inspector of vessels in repair or construction, 1861-66; as asst. naval constructor at Pensacola and at Philadelphia, and instructor at Annapolis 1866-73; as naval constructor at Portsmouth 1873-82; and as chief of the bureau of construction and repair after 1882. His reputation has been much increased by his designs for vessels of the 'white squadron,' and other

recent constructions. The air-ports, bolt-extractors, and other devices invented by him have been generally adopted. He was the first American elected to the Institution of Naval Architects of England. He wrote *Shipbuilding, Theoretical and Practical.*

WILSON, THOMAS, D.D.: English Anglican prelate; b. Burton, England, 1663, Sept. 20; d. Isle of Man 1755, Mar. 7. He was educated at Trinity College, Dublin, and was curate of Newchurch Kenyon, 1686-92. He then became chaplain to the Earl of Derby, who appointed him bishop of Sodor and Man in 1697. His episcopate lasted 58 years and is noted for his strict insistence upon his privileges as head of the ecclesiastical court. This occasioned frequent disputes with the governor of the Isle of Man and he was at one time imprisoned for two months. He was the author of *Principles and Duties of Christianity* (1707), commonly called the Manx Catechism—the first book printed in the native tongue; *The Knowledge and Practice of Christianity Made Easy to the Meanest Capacities* (1775); *Short and Plain Instructions for the Better Understanding of the Lord's Supper* (1736); *Sacra privata, Private Meditations, Devotions, and Prayers* (1800); *Parochialia, or Instructions for the Clergy* (1788); *Maxims of Piety and Christianity* (1789). He instituted a Manx translation of the Bible, completed 1772-5.

WIL'SON, THOMAS: merchant: 1789, Feb. 5—1879, Sept. 2; b. Harford co., Md. In 1798 his parents removed to Baltimore. At 17 years of age Wilson entered the house of Thorndick Chase, trading with the W. Indies and Spain; and in less than two years became its chief clerk. At 21 the firm of Brown and Wilson was established, and he was for several years its resident partner in South America. In 1857 he retired from mercantile business. He was a member of the Maryland Colonization Soc., and pres. for many years of the Baltimore Manual Labor School. In the civil war he was loyal to the Union. At his death in Baltimore, he left $625,000 for charities in Baltimore, among them the Thomas Wilson Sanitarium for the care of sick children.

WILSON, WILLIAM: American poet; b. Perthshire, Scotland, 1801, Dec. 25; d. Poughkeepsie, N. Y., 1860, Aug. 25. He edited the Dundee *Review*, 1821-3, did newspaper work in Edinburg, where he was a friend of the brothers Chambers, and coming to this country in 1833, established himself at Poughkeepsie as bookseller and publisher. His *Poems*, edited by Lossing, appeared in 1870 and revised and enlarged editions in 1875 and 1884.

WILSON, WILLIAM DEXTER, D.D.: American philosopher and Episcopal clergyman: b. Stoddard, N. H., 1816, Feb. 28; d. Syracuse, N. Y., 1900, July 30. He was graduated from the Harvard Divinity School in 1838 and

took orders in the Episcopal ministry in 1842. In 1850-68 he occupied the chair of philosophy at Hobart College, resigning in the last mentioned year to become registrar and professor of moral philosophy at Cornell University. He was made professor emeritus there in 1886 and during the last years of his life was dean of Saint Andrew's Seminary at Syracuse. He published: *Introduction to the Study of the History of Philosophy* (1872); *First Principles of Political Economy* (1875); *The Foundations of Religious Belief* (1883); *Theories of Knowledge Historically Considered* (1889); etc.

WILSON, Sir William James Erasmus: English surgeon and philanthropist; b. London 1809; d. Westgate-on-Sea, Kent, 1884, Aug. 8. He went through a course of hospital practice in Paris, where he became known to Cuvier and Goeffroy de St. Hilaire, later attached himself to the Aldersgate School of Medicine, and was engaged in 1831 as assistant to Dr. Quain, professor of anatomy in University College. His first work, *Practical and Surgical Anatomy,* was published in 1838, followed in 1840 by the *Anatomist's Vade Mecum.* About this time he determined to devote himself to dermatology, and soon became the acknowledged authority in that hitherto obscure branch of medical science. He became fellow of the Royal College of Surgeons in 1843, and president in 1871. In 1845 he was elected a fellow of the Royal Society. By the time he had reached his 50th year he had amassed considerable wealth, and he then began a series of public and private acts of munificence, founding a professorship of dermatology in the College of Surgeons, the chair of which he filled for nine years, contributing £7,000 to Epsom Medical College, restoring the ancient church of Swanscombe, Kent, founding a chair of pathology at Aberdeen, subscribing liberally to the Royal College of Music, and to the Margate Sea-bathing Infirmary. He devoted much attention to Egyptology, was president of the Egypt Exploration Fund, and furnished £10,000 for the transport of the obelisk known as 'Cleopatra's Needle' from Alexandria to its present site on the Thames Embankment. In 1881 he was knighted. Besides many publications in his special science he published, *Cleopatra's Needle, with Notes on Egypt and Egyptian Obelisks;* and *The Egypt of the Past.*

WILSON, William Lyne; American educator and legislator; b. Jefferson co., Va., 1843, May 3; d. Lexington, Va.; 1900, Oct. 17. He was graduated from Columbian College in 1860, and later studied at the University of Virginia. He served as a private in the Confederate army through the civil war, and in 1865-71 was professor of ancient languages at Columbian College. He was meantime engaged in the study of law, in 1867 was admitted to the bar, and several years later began practising law in Charlestown, W. Va. He was elected

president of the University of Virginia in 1882, Sept., and in the same month was elected to congress. In 1883, June, he resigned his presidency of the university, but served continuously in congress until 1894. He framed the Wilson tariff bill, but disapproved of the amendments it received in the senate. In 1895 was appointed postmaster-general by President Cleveland, and from 1897 until his death was president of Washington and Lee University.

WILSON, Woodrow, ph.d., ll.d., litt.d.: American educator and historian; b. Staunton, Va., 1856, Dec. 28. Graduated from Princeton in 1879; he studied law in the University of Virginia, and practised at Atlanta, Ga., in 1882-3. After special studies in history and politics at the Johns Hopkins University (1883-5), he was an associate-professor at Bryn Mawr in 1886-8, in 1888-90 professor of history and political economy in Wesleyan University, and in 1890 was appointed to the chair of jurisprudence and politics at Princeton. Upon the resignation of President F. L. Patton (q.v.) in 1902, he was elected president of the university, the first layman so chosen, and he retained this office until the fall of 1910, when he was elected Governor of New Jersey. He contributed largely to periodicals on administrative and political subjects, and took high position as a scholar and author by a series of works, including: *Congressional Government: A Study in American Politics* (1885), which gained for him recognition on both sides of the Atlantic, and in England was taken as authoritative on American institutions; *The State: Elements of Historical and Practical Politics* (1889), a standard book; *Division and Reunion 1829-1889* (1893); *An Old Master, and Other Political Essays* (1893); *Mere Literature and Other Essays* (1896); *George Washington* (1896); and a *History of the American People* (1902), a five-volume publication, in many respects the most satisfactory compendious narrative of the political history of the United States.

WILSON, N. C.: town, county-seat of Wilson co.; on the Atlantic Coast Line railroad; about 42 m. e.-by-s. of Raleigh. It is an agricultural region in which the chief products are cotton and tobacco. The principal manufacturing establishments are cotton and lumber mills, carriage factories, foundries, machine shops, tobacco works, and flour mills. The town owns the electric light plant and the waterworks. The three banks have a combined capital of $210,000. There are public and private schools for both races. Pop. (1900) 3,525; (1910) 6,717.

WILSON BILL, The: a tariff measure enacted by Congress in 1895, succeeding the McKinley Bill of 1890. The Wilson tariff bill was based on the cost of raw material rather than on the cost of production, and was passed in the interest of the manufacturer. By this

bill wool was placed on the free list or was made free of duty.

WILSON COLLEGE: a college for women, located at Chambersburg, Pa. It was established in 1870 under the auspices of the Presbyterian church. The majority of the board of trustees are Presbyterians, and the college is under the special care of the Synod of Pennsylvania. The courses offered are a classical course leading to the degree of A.B., a musical course leading to the degree of bachelor of music, and an art course entitling the student to a diploma in art. Each course is four years in length; the work in all courses includes required and elective studies, the latter coming mostly in the junior and senior years. Bible study is required in all courses. History and theory of art and music are included among the regular electives of the classical course; and arrangements are made so that students can take technical art and music courses and at the same time do the full amount of work required for the A.B. degree. There are also preparatory, classical, art, and music courses. Gymnastic work is required for three years of the college course, and the outdoor sports of rowing, tennis, basket-ball, and hockey are encouraged. The students maintain three literary societies, one for the preparatory and younger students; membership in one of these societies is required. The college campus comprises 25 acres located in the suburbs of Chambersburg; the Conococheague flows through the grounds, affording opportunity for rowing and fishing. The buildings include Main Hall, Fletcher Hall, South College, Science Hall, the Dining Hall, the Gymnasium, Frank Thomson Music Hall, with a large auditorium, the infirmary, and Harmony Cottage. Tuition is free to ministers' daughters who live at the college. The library contains 7,000 volumes; the students number 320.

WIL'TON, Joseph: English sculptor: b. London 1722, July 17; d. there 1803, Nov. 25. He studied in Paris and in Rome, and while at Rome in 1750 won the gold medal awarded for sculpture by Benedict XIV. on the occasion of his jubilee. He returned to England in 1755 and in 1758 became director of the art gallery of the Duke of Richmond. He was one of the founders of the National Academy and one of its first exhibitors. His busts and monuments were in much demand, among the former being those of Bacon, Cromwell, Isaac Newton, Chesterfield, Chatham and other prominent characters. From 1790 until his death he was keeper of the National Academy.

WILTON, Maine: town in Franklin co.; on the Maine Central railroad; about 8 m. s.w. of Farmington. It was settled in 1789 and in 1803 was incorporated. It has lumber mills, trunk and carriage factories, creameries, woolen mills, and agricultural implement works.

The educational institutions are Wilton Academy, public schools, and a school library. Pop. 2,143.

WILTON CARPET: a variety of carpet made similar to Brussels, excepting that the wire is flattened instead of being round, and has a groove along the upper surface, which acts as a director for the knife by which the loops are cut and the wire liberated.

WILTSHIRE, *wĭlt'shēr*, or WILTS, *wĭlts:* county of England; bounded w. and n. by Somerset and Gloucester; e. and s. by Berks, Hants, and Dorsetshire. It is divided into two unequal parts—the plains in the n., and the hill district, which comprises the greater part of s.w.; and the separation between these two parts is nearly that of the main line of the Great Western railway n.e. to s.w. The plains incline n. to the basin of the Thames, which forms in part the n. boundary, and are noted for their agricultural capabilities. The surface of this district is checkered with grain-fields and rich pastures; and here the cheeses for which Wiltshire is favorably known are produced. The hill district (on the chalk) presents ranges of bleak downs, with deep valleys, and is thinly peopled. Inkpen Beacon, 1,011 ft. high, at the junction of Wiltshire, Hampshire and Berkshire, is the nucleus whence proceed the North and South Downs of Surrey and Sussex, and the hills which, running s. through this county, become the North and South Downs of Dorsetshire. Agriculture is in an improved state; and Wiltshire bacon is famous. Portland stone is quarried; there is a fine oolite, known as Bath stone; and a Forest Marble yields coarse tiles and flagstones. The manufacture of woven goods, carpets and other woolen goods, silks and linens, is carried on at Trowbridge, Wilton, Bradford, Devizes, Westbury, etc. There are iron mines and blast-furnaces at Westbury and Seend, and Swindon is one of the greatest railway workshops in the kingdom. The principal rivers are the Thames, with its tributary, the Kennet; the Bristol Avon (which communicates with the Thames and Severn by the Wilts and Berks canal, and again with the Thames by the Kennet and Avon canal), and the Salisbury Avon, with four tributaries spreading over the whole of s. Wiltshire. Pop. (1901) 271,372.

WI'LY, WI'LINESS, etc. See WILE.

WIMAN, *wī'man*, ERASTUS: promoter of public enterprises: b. Churchville, Ont., Canada, 1834, Apr. 21; d. 1904, Feb. 9. Erastus Wiman built the Arthur Kill bridge and obtained the sanction of Congress for construction of a tunnel under New York bay connecting New York, Long Island and Staten Island. He wrote *Chances of Success* (1893). 1864-5 he edited the *Trade Review*, Montreal; 1856 he was employed by R. G. Dun & Co. in their mercantile agency, the next year becoming a partner, and later their New York manager. In

1881 he was chosen president of the Great Northwestern Telegraph Co. He was a director of the Western Union Telegraph Co., and pres. of the Rapid Transit Co. of Staten Island, where he had his residence. He was instrumental in the passage of a congressional bill for the railroad bridge between Staten Island and New York; in the adoption by the Canadian liberal party, 1888, of their reciprocity policy; and in bringing about the abolition of imprisonment for debt in the state of New York. In 1894, he was convicted of forgery on a purely technical charge, but promptly obtained stay of sentence, and in 1896 the indictments were dismissed for lack of any proof of evil intent.

WIMBLE, n. *wĭm'bl* [Dan. *vimmel*, an auger or boring-tool; *vinde*, to turn, to twist: O. Dut. *wemelen*, to turn round, to bore: *gimlet* is from the same root]: a boring-tool turned by handle; an auger; a gimlet; also, a kind of shell-auger used by miners to remove rubbish from a borehole: V. in *OE.*, to bore. WIM'BLING, imp. *-blĭng*. WIMBLED, pp. *wĭm'bld*.

WIMBLE, a. *wĭm'bl* [Sw. *vimmla*, to be giddy: Icel. *vim*, giddiness (see also WHIM)]: in *OE.*, active; nimble.

WIMBLEDON, England: a town of Surrey, s.w. of London, of which it is practically a suburb, at the n.e. extremity of the common of same name, which until 1889 was well known in connection with the shooting competitions of the National Rifle Association. It has a free library, alms-houses, three hospitals, and many fine residences, being a favorite residential locality. The common has an area of about 1,000 acres. Pop. (1901) 41,604.

WIMBORNE, or WIMBORNE MINSTER, England: a market-town of Dorsetshire, on the Wimar Allen river, near its confluence with the Stour, about 7 m. n.w. of Bournemouth. It is of historical interest in connection with its fine cruciform minster, the collegiate church founded by Edward the Confessor which succeeded the convent established by Saint Cuthbuhr, King Ine's sister, in 705. The minster exhibits various styles of transitional architecture from the Norman onward, has a central and a w. tower, and contains several interesting features, including the tomb of Ethelred I., and a mediæval chain-library, one of the few in existence where the books are chained to the shelves. The grammar school in the town was founded in 1496. Pop. (1901) 3,696.

WIMODAUSIS, THE: a benevolent secret society, composed exclusively of the wives, mothers, unmarried daughters and unmarried sisters of Master Masons. It originated in Pittsburg, Pa., in 1895. The object of the society is: "To promote friendship and a kindly interest in the welfare of the members, and to stimulate

intellectual activity by an interchange of thought on all subjects which will tend to the mutual advancement of the wives, mothers, daughters, and sisters of Master Masons.'

WIMPLE, n. *wĭm'pl* [Ger. *wimpel;* Dan. and Sw. *vimpel,* a streamer; Dut. *wimpel,* a streamer, a pendant]: *formerly,* a plaited covering of silk or linen for the neck, chin, and sides of the face, worn as an outdoor covering, now retained only in the dress of nuns: V. to ripple; in *OE.,* to draw down as a hood or veil; to lay or lie in folds.

WIN, v. *wĭn* [Dut. *winnen,* to gain, to conquer: Dan. *vinde;* Icel. *vinna,* to perform work, to do something for an end: AS. *winnan,* to struggle, to get by labor]: to acquire by labor or exertion; to obtain, especially by effort; to earn; to gain in competition or contest; to gain by kindness, persuasion, or solicitation; to gain by wagering; to gain over; to gain ground, favor, or influence; to succeed; to gain one's end; to get or succeed in getting, as to *win* in (to get in), to *win* up (to rise or get up). WIN'NING, imp.: ADJ. attractive; adapted to please or gain favor; N. in *mining,* the whole series of operations of boring, sinking, excavating, etc., by which any mineral, particularly coal, is procured or won from the crust of the earth. WINNINGS, n. plu. *-nĭngz,* earnings; the sums gained by success in competitions or contests. WON, pt. pp. *wŭn.* WINNER, n. *wĭn'nėr,* one who wins or gains. WIN'NINGLY, ad. *-lĭ,* in an attractive or winning manner.—SYN. of 'win': to acquire; obtain; gain; attain; accomplish; procure; get.

WINAMAC, Ind.: county-seat of Pulaski co.; on the Tippecanoe river, and on the Pittsburg, C. & C. railroad; about 90 m. s.e. of Chicago and 23 m. n.w. of Logansport. It has considerable trade; the principal shipments are farm and dairy products. The principal public buildings are the court-house, four churches, and the public and parish schools. The two banks have a combined capital of $50,000. Pop. 1,750.

WINAN'DERMERE: See WINDERMERE.

WINANS, Ross: American inventor: b. Vernon, N. J., 1796, Oct.; d. Baltimore, Md., 1877, Apr. 11. He went to England to examine English railroad systems in the interest of the Baltimore & Ohio railroad; and after his return built the first locomotive used on that railroad. He also invented the camel-back locomotive and the eight-wheeled car, and established in Baltimore some of the largest machine shops in the United States. He was active in political matters prior to the Civil War and in 1861 was elected to the extra session of the Maryland legislature, but was imprisoned in Fort McHenry. He was author of several pamphlets on religious subjects and also of *One Religion, Many Creeds* (1870).

WINANS, THOMAS DEKAY: American engineer, son of Ross Winans; b. Vernon, N. J., 1820, Dec. 6; d. Newport, R. I., 1878, June 11. He was taken into partnership by his father on coming of age, and was sent by him in company with his brother William to make contracts with the Russian government for furnishing and managing the equipment of a railroad between Moscow and Saint Petersburg. With Andrew M. Bostwick and Joseph Harrison he entered into a contract for $3,000,000, and afterward was engaged in other lucrative contracts with Russia. Upon his return to the United States he became interested in inventions, and with his father and brother invented a system of steam navigation known as the 'cigar-ship'; a tubular adjustment for the feeding of young trout; and various other mechanical devices.

WINCE, v. *wĭns* [OF. *quinchir, guenchir,* to start, to shrink: OHG. *wankon,* to wince, to start aside: Ger. *winken,* to nod (see WINK)]: to shrink or start back; to flinch; to twist or turn, under pain or through impatience; to kick or flounce when uneasy, as a horse: N. a shrinking or start back. WINCING, imp. *wĭns'ĭng.* WINCED, pp. *wĭnst.* WIN'CER, n. *-ẽr,* one that winches.

WINCE, n. *wĭns* [the same word as WINCH 1]: the dyer's reel upon which the cloth turns while being dyed or transferred from one vat to another.

WINCEY, n. *wĭns'sĭ:* a stout fabric with a cotton warp and a woolen weft, much used for dresses for women and children; another name for LINSEY-WOOLSEY (q.v.).

WINCH, n. *wĭnch* [AS. *wince,* a reel to wind thread upon: from the same root as *wince* and *wink*]: the bent handle or crank by which a wheel or axle is turned; a windlass; in *mining,* a wheel or axle frequently used to draw water, etc., in a bucket by a rope; a twist or turn; also a dyer's wince.

WINCH, v. *wĭnch* [a form of *wincc*]: in *OE.,* to shrink; to wince. WINCH'ING, imp. WINCHED, pp. *wĭncht.*

WINCHELL, *wĭn'chĕl,* ALEXANDER, LL.D.: geologist: 1824, Dec. 31—1891, Feb. 19; b. North East, Dutchess co., N. Y. He graduated 1847 at Wesleyan University, Middletown, Conn.; taught natural science 1848 at Pennington Seminary, New Jersey; was teacher in Alabama 1850-54; and professor of geology, zoology, and botany in the University of Michigan 1854-73. Meanwhile he was director of the geological survey of Michigan 1859-61, and again 1869-71, when he resigned the office. He became chancellor of the University of Syracuse, N. Y., 1873, but at the end of the year retired from the chancellorship, and was professor of geology, zoology, and botany till 1879, in the meantime holding a similar chair in Vanderbilt University 1875-78. He took the

chair of geology, and paleontology in Michigan University 1879, and held it till his death. He was author of more than 200 separate contributions to the literature of science. Besides his strictly technical essays and notices, and his official reports on the geology of Michigan and Minnesota, Dr. Winchell contributed frequently to popular magazines, and published a great number of books, among them *The Doctrine of Evolution* (1874); *Reconciliation of Science and Religion* (1877); *Preadamites, or a Demonstration of the Existence of Men Before Adam* (1880); *Walks and Talks in the Zoological Field* (1886).

WIN'CHENDON, Mass.: town in Worcester co.; on the Miller river, and on the Boston and Albany and Boston and Maine (Fitchburg division) railroads; 35 m. n.n.w. of Worcester. It was settled in 1752, and incorporated as a town in 1764; the town includes the villages of Winchendon, Waterville, and Winchendon Springs. It is principally a manufacturing town; the chief manufactures are wooden-ware, wood-working machinery, toys, and cotton goods; there is a national bank with a capital of $200,000, and a savings bank. It contains the New England Home for Orphan and Destitute Children; and has several elementary schools, and the Murdock High School established in 1885 with a school library of 1,200 volumes (in 1904), and occupying a fine building valued at $100,000; there is also a public library. The town owns and operates the system of water-works. Pop. (1900) 5,001; (1910) 5,678.

WIN'CHESTER, England: an ancient city, capital of Hampshire, situated on the right bank of the Itchen, 11 m. n. of Southampton. The most important edifice is the cathedral; the oldest parts date from the 11th century, but the greater part of the main building was erected at various times from the 13th to the 16th century, William of Wykeham (1324-1404) having an important share in the work. It has a central tower without a spire and no other towers; length from e. to w. 545 ft., width of the transepts 186 ft. The length of the nave, which has a beautiful interior, is 351 ft., height 86 ft.; the transept contains several beautiful chapels and altars. Numerous monuments include the tombs of William Rufus, of Edmund, son of King Alfred; of William of Wykeham, Cardinal Beaufort, and of Izaak Walton; the shrine of St. Swithin; etc. Other notable edifices and establishments are St. Mary's College (Winchester College or School, one of the great English public schools), founded by William of Wykeham in 1387, richly endowed and accommodated in a large range of buildings, of which the chapel, hall, and library are beautiful specimens of architecture; the guildhall; the old castle, which has been restored and assize courts built adjoining; a corn-exchange; barracks for 2,000 infantry; the hospital

of St. Cross, founded in 1132, several other charitable institutions, a free library and museum, school of art, etc. The Abbey Gardens are very beautiful, and statues of Alfred the Great by Hamo Thornycroft, erected for the millenary of the king celebrated at Winchester in 1901, and of Queen Victoria by Alfred Gilbert, adorn the town. There are no manufactures or trade of any consequence. Winchester was called Caer-Gwent by the Britons, Venta Belgarum by the Romans—under whom it was an important place, with a Christian church—and Wintanceaster by the Saxons. It became the capital of England under the Saxons, when the country was united under the sway of Egbert, in the first half of the 9th century, and it retained this dignity till the middle of the 11th century, being a royal residence and place where parliaments met after this also. After the battle of Naseby it stood a week's siege by Cromwell. Pop. (1901) 20,919.

WINCHESTER, Ill.: city, county-seat of Scott co.; on the Big Sandy creek, and on the Chicago, Burlington and Quincy railroad; 45 m. w.s.w. of Springfield, Ill. It was first settled in 1830. It is in an agricultural region for which it is the shipping point; it contains grain elevators, flour mills, a meat-packing establishment, and a plow factory; there are two private banks. It has a public high school. Pop. 2,000.

WINCHESTER, Ind.: city, county-seat of Randolph co.; on the White river, and on the Grand Rapids and Indianapolis, and the Cleveland, Cincinnati, Chicago and St. Louis railroads; about 68 m. n.e. of Indianapolis. It is in an agricultural region and in a natural-gas belt. It has flour and lumber mills, brick and tile works, machine shops, and a number of repair shops. The educational institutions are a high school, established in 1894, public graded schools, and the Randolph County Law Library. The three banks have a combined capital of $140,000. Pop. 3,870.

WINCHESTER, Ky.: town, county-seat of Clark co.; on the Chesapeake and Ohio, and the Louisville and Nashville railroads; 18 m. s.e. of Lexington. It is in an agricultural region, in the 'Blue Grass' country. It has flour mills, spoke and rim factory, planing mills, and machine shops. The principal shipments are farm products and live-stock. The educational institutions are the Kentucky Wesleyan College (M. E. South), opened in 1866, and the public and private schools. The two banks have a combined capital of $200,000. The town was incorporated in 1792. Pop. Pop. (1910) 7,156.

WINCHESTER, Mass.: town in Middlesex co.; on the Boston and Maine railroad; about 8 m. n. by w. of Boston. In 1638 the place was known as Waterfield, which, in 1640, was changed to Charlestown Village. In 1642 it was called Woburn, and in 1850 the present name was

adopted. It has many places of great beauty, and it is a favorite residential suburb for Boston. It has manufactories for watch hands, leather and felt goods. There are machine shops and grist mills. A part of 'Middlesex Fells,' a state park, which has an area of 3,020 acres, is in this town. It has a state aviary, and a home for aged people. The educational institutions are a high school, established in 1850, graded public schools, and a public library which contains about 14,000 volumes. There are two banks. Pop. (1910) 9,309.

WINCHESTER, Tenn.: town, county-seat of Franklin co.; on the Elk river, and on the Nashville, Chattanooga and St. Louis railroad; about 80 m. s. by e. of Nashville. It is near the foot of the Cumberland Mountains, in an agricultural region. The town has considerable mining and lumbering interests. It is a favorite health resort. The chief industrial establishments are lumber and planing mills, wagon and carriage factories, woodworking factories, marble works, flour mills, and machine shops. It has one bank. Pop. 1,460.

WINCHESTER, Va.: city, county-seat of Frederick co.; on the Cumberland Valley and the Baltimore and Ohio railroads; about 81 m. w. by n. of Washington, D. C. It is in an agricultural and stock-raising region and has considerable lumbering interests. It has flour and paper mills, lumber mills, woolen mills, glove factories, tanneries, and machine shops. The educational institutions are Valley Female College (M. E. South), opened in 1874; the Shenandoah Valley Academy, Fairfax Hall, the John Kerr High School (white), established in 1872; a high school for colored pupils, elementary schools for both races, and a public library. The principal public buildings are the court-house and the city-hall. There are National and Confederate cemeteries.

Fort Loudoun, built under Washington, and Washington's headquarters are of historic interest. Washington's occupancy of Winchester was in 1755, after Braddock's defeat. Washington was stationed here, in command of the colonial and British forces. During the civil war, Winchester was for some time a battle centre. On Oct. 19, 1864, Sheridan left Winchester on his famous ride teries. Pop. (1910) 5,864.

WIN'CHESTER COLLEGE, or SAINT MARY'S COLLEGE; called originally 'Seinte Marie College of Wynchestre': school at Winchester, England; founded by William of Wykeham, bishop of Winchester, 1387. The buildings, mostly completed 1393, consist of two quadrangles and a cloister; with recently erected houses for the commoners. Its fine chapel, cloister, etc., are still in good preservation. The foundation consisted originally of a warden, 10 fellows, 70 scholars, a head-master (*informator*), an usher (*ostiarius*) or second master, 3

chaplains, 3 clerks or singing-men, and 16 choristers. By an ordinance which took effect 1857, many long-needed changes were made. The charter (still preserved) was granted by Richard II. 1396, and confirmed by all the subsequent sovereigns, except Mary, down to Charles II. The visitor is the bishop of Winchester, and the warden and two fellows of New College, Oxford, hold an annual 'scrutiny.' The endowment amounts at present to about £15,500 annually. The warden and fellows are the governing body. The pupils are of two classes—foundation scholars and commoners. The *scholars* are elected, between 12 and 14 years of age, by competitive examination; the average annual vacancies being 12, and candidates 100. The scholars are well boarded, lodged, and educated, at the expense of the foundation, having to pay various incidental charges; but tradition rules at Winchester, and many of the quaint old customs of the school, such as dining off wooden trenchers, etc., are still retained. The *commoners,* since the changes in 1857, have averaged about 300 annually; they generally enter between 12 and 15 years of age, remain 3-4 years, and board at their own charges in the houses of the head and other masters. Winchester College has exhibitions at New College, Oxford, or elsewhere; also scholarships and numerous other prizes. Fagging is permitted to the 18 chief boys, who are called 'prefects.' The monitorial system was established first in this college.

WINCING MACHINE, *wĭn'sĭng-:* the reel used by dyers for winding out of their dye-vats long pieces of cloth. The vat is often divided by a partition, and the wincing machine is generally so placed that it will wind the piece of cloth from one compartment to the other, according to the direction given to the handle.

WINCKELMANN, *wĭnk'ĕl-man,* Ger. *vĭnk'kĕl-mân,* JOHANN JOACHIM: critical expounder and historian of ancient classic art: 1717, Dec. 9—1768, June 8; b. Stendal, Prussia. His parents were poor. He early showed eager desire for knowledge, and by serving as amanuensis to an old and blind rector, contrived to pass through the course at the free school. After studying at a gymnasium in Berlin, he went 1738 as student of theology to the University of Halle, where he remained two years. Conceiving a distaste for theology, he turned to history and literature, and maintained himself as a schoolmaster, till Count von Bünau employed him as secretary in his library at Nothenitz, near Dresden, where he had access to the famous treasures of art accumulated in that city. He also made the acquaintance of Oeser and other eminent artists; and was awakened to enthusiastic study of the theory and history of art. Being thrown into the society of the pope's nuncio, Cardinal Archinto, he was induced, after some hesitation, to become a Roman Catholic, on a promise of a pension being procured for him, to enable him to proceed to Rome. Thither he went

1755, having published at Dresden a treatise, *Gedanken über die Nachahmung der Griech. Werke,* etc. (Reflections on the Imitation of the Antique, 1754; new and enlarged edition 1756). At Rome he studied with the utmost ardor, and every facility was afforded him: also he visited the remains of Herculaneum, Pompeii, and Pæstum; and examined collections of antiquities elsewhere. Soon the Cardinal Albani appointed him his librarian, and he was enabled to prosecute his studies in comfort. The first-fruits appeared in *Anmerkungen über die Baukunst der Alten* (Remarks on the Architecture of the Ancients), printed in Germany 1762; and 1764 the great work of his life, on which he had been long engaged, the celebrated *Geschichte der Kunst des Alterthums* (History of Ancient Art), was issued from the press of Dresden: a supplement appeared 1767. *Monumenti Antichi Inediti,* an elaborate work with plates, appeared 1766.

In 1768 Winckelmann, by this time famous throughout Europe, set out to revisit Germany. His destination was Berlin; but on reaching Munich, he started to return to Rome. He went by Vienna, where the most flattering attentions were shown him by Empress Maria Theresa: proceeding thence to Trieste, he came to his tragic end at the hands of a fellow-traveller, Franceso Arcangeli, to whom Winckelmann incautiously showed some gold coins given him by the empress, and who murdered him in order to plunder his effects. The murderer was presently caught and put to death.

Winckelmann was the forerunner of a great movement; he was indeed the founder of scientific archeology; and his influence has been great in all the subsequent literature of the subject. Even at this day, when much of his great *History* has become obsolete, it remains as a work not to be neglected by any student of this branch of æsthetics. The most complete edition of Winckelmann's works is Fernow, Meyer, and Schultz's (8 vols. new ed. 1828). See Life of Winckelmann by Justi (1866-73).

WIND, v. *wīnd* [Goth. *vindan;* Icel. *vinda,* to wrap round, to twist: Icel. *vindr,* crooked: Sw. *winda,* to squint: Ger. *winden,* to wind, to turn]: to turn in this direction and in that; to pursue a crooked or devious course; to meander; to twine; to entwine; to warp or become uneven in surface, as from unequal drying; to turn or twist round some fixed object; to turn or move around something; to form into a coil, or ball, either by placing the thing coiled in successive convolutions or folds on something, or by turning that on which they are laid; to enfold; to encircle; to wrap; to entwist; to hoist as with a winch, windlass, or capstan; to adjust by coiling the actuating spring of, as to *wind* a watch; to advance or introduce one's self by stealthy insinuating methods. WIND'ING, imp.: ADJ. bending; twisting

from a direct line or an even surface: N. a turning; a bending first one way and then another, as a river. WOUND, pt. pp. *wownd.* WIND'ER, n. *-ėr,* one or that which winds; a reel for winding silk or cotton on. WIND'INGLY, ad. *-lĭ,* in a circuitous form or manner. WIND'ING-SHEET, a sheet or cloth in which a dead body is wound or wrapped. To WIND OFF, to unroll; to uncoil. To WIND OUT, to extricate; to be disentangled. To WIND UP, to bring into a small compass; to roll into a ball or coil; to bring to a final settlement, as the affairs of an estate or company; to put into a state for continuing motion, as a clock; to raise by winding; to raise by degrees; to straighten a string by turning that on which it is entwined.

WIND, n. *wĭnd* [AS., Dut., and Ger. *wind;* Goth. *vinds;* Icel. *vindr;* W. *gwynt;* L. *ventus,* wind]: air in perceptible motion; a current of air having a greater or less degree of velocity; one of the cardinal points, as from the *four winds;* breath; power of breathing; flatulence; anything insignificant or light as wind; hence, something ineffectual or empty; idle words; bombast; 'gas': V. to deprive of breath by overdriving, as a horse; to rest a horse that he may recover his breath; to follow by scent; to nose; to sound by blowing, as a horn, so that the sound may be prolonged [pronounced *wīnd*]. WINDING, imp. *wĭnd'ĭng*—pronounced *wīnd'ĭng* when applied to the prolonged blast of a wind-instrument, as a hunting-horn. WINDED, pp. *wĭnd'ĕd.* WINDED, pp. *wīnd'ĕd.* WOUND, pp. *wownd,* said of a horn. WIND'Y, a. *-ĭ,* pertaining to or consisting of wind; next or exposed to the wind; abounding with wind; airy; tempestuous; flatulent; empty. WIND'INESS, n. *-nĕs,* state of being windy; tendency to generate wind; flatulence. WIND'AGE, n. *-āj,* in a *gun,* the space between the ball and the bore, being the difference between the diameter of the bore and that of the shot. Formerly the difference allowed was considerable, but this served only to diminish the force of the explosion and to give an irregular motion to the projectile. Some windage is indispensable, in order to permit some portion of the explosive gas to escape and to prevent friction; and in rifled artillery it is sought to reduce it to a minimum, say .01 of an inch. The term *windage* is used also for the effect of the wind in deflecting a missile or projectile in its flight toward the point aimed at, as well as the amount of such deflection, or the allowance made for it in taking aim; the rush of air which accompanies or is produced by a shot; a contusion produced by such a rush of wind; Wind Contusion. WIND'LESS, a. *-lĕs,* wanting wind; out of breath. WIND'WARD, n. *-wėrd,* the direction from which the wind blows: ADJ. on the side toward the direction from which the wind blows: AD. toward the wind. WIND'-BAG, an incessant frivolous talker. WIND'BOUND, prevented from sailing by a contrary wind, binding or restraining the

ship to the harbor, river, or roadstead. WIND BREAK, any shelter from the wind. On western prairies, *colloq.*, a shelter belt of timber planted about buildings. WIND'-BROKEN, affected by disease in the breathing, as a horse. WIND'-EGG, an egg said not to contain the principles of life; properly, an egg laid without a shell. WIND'FALL, fruit blown off a tree by wind; any unexpected gain or advantage, as a legacy. WIND'-FLOWER, the Anemone. WIND'-GAUGE, an instrument for ascertaining the velocity and force of the wind; an anemometer. WIND-GALL, soft tumor on the fetlock-joints of a horse, and sometimes of other animals, resulting from irritation and inflammation within the delicate synovial cavities, which thus secrete an unusual quantity of thickened synovia. Wind-galls are caused by strains, overwork, or fast driving. Though not always causing lameness, they make the affected animal unsound. Remedial measures are rest, rubbing, bathing with cold water or astringent lotions, and the use of bandages. A spring truss so arranged as to bring pressure directly on the swelling sometimes proves beneficial. Blistering, often resorted to, is not to be recommended. WIND'-HOVE, among cattle, the inflation of the stomach by wind: see HOVEN (under HOVE). WIND'-INSTRUMENT, a musical instrument played by means of the breath, as a flute, or by artificial currents of air, as an organ (see below). WIND JAMMING, *slang*, perfervid oratory, not inspired by reflection, or conviction. WIND'MILL, a mill driven by the wind (see below). WIND'PIPE, the passage for the breath to and from the lungs; the Trachea (q.v.). WIND'-ROSE, the thirty-two points of the mariner's compass, having the appearance of a rose; an account of the mean pressure of the air from the various points of the compass. WIND'-SAIL, a wind-tube or funnel of canvas for conveying a stream of air into the lower apartments of a ship. IN THE WIND'S EYE, in the direct point from which the wind blows. BETWEEN WIND AND WATER, in that part of a ship's side or bottom which is frequently brought above the water by the rolling of the ship or by the fluctuating of the water. DOWN THE WIND, in the direction of and moving with the wind. THREE SHEETS IN THE WIND, in *slang*, partially intoxicated. TO BE IN THE WIND, to be in secret preparation; to be within the reach of suspicion, though not announced or acknowledged; to be rumored or talked of, though not publicly announced. TO WIND A SHIP, to turn it completely so that the wind may strike it on the opposite side. TO CARRY THE WIND, to toss the nose as high as the ears, as a horse. TO RAISE THE WIND, to procure money. TO TAKE OR GET WIND, to be divulged; to become public. TO TAKE OR HAVE THE WIND, to gain or have the advantage. TO TAKE THE WIND OUT OF ONE'S SAILS, to circumvent, coming, as it were, between the wind and another; to bring down. TO SAIL CLOSE TO THE WIND, to sail as nearly against the wind as possible; hence, figuratively, to be as dishonest as one con-

veniently can.—Syn. of 'wind, n.': breeze; blast; gale; gust; squall. *Note.*—In *poetry* it is to be noted that *wind* is usually pronounced *wīnd.*

WIND: air in motion. Winds vary in force as they vary in direction. The direction of wind may be shown by the Weather-cock, its velocity and pressure by the Anemometer. Wind with a velocity of 7 m. an hour is a gentle air; of 14 m. an hour, a light breeze; 21 m., a steady breeze; 40 m., a gale; 60 m., a heavy storm; and 80 to 150 m., a hurricane sweeping everything before it. A wind with a velocity of 5 m. an hour has a pressure of 2 oz. on the sq.ft.; 10 m., ½ lb.; 20 m., 2 lbs.; 30 m., 4½ lbs.; 40 m., 8 lbs.; 51 m., 13 lbs.; 60 m., 18 lbs.; 70 m., 24 lbs.; 80 m., 32 lbs.; and 100 m., 50 lbs. In the Tay Bridge storm (1879, Dec.) the cyclone travelled 40 to 70 m. an hour, the velocity of some gusts reaching from 96 to 150 m.

The average hourly velocity of the wind at the several representative American cities is as follows: Albany, 7.8 m. per hour; Atlanta, 10; Baltimore, 5; Bismarck, 9.8; Boston, 11.4; Cheyenne, 10.7; Chicago, 16.6; Columbus, 7.7; Denver, 8.3; Galveston, 9; Harrisburg, 7.3; Helena, 7.7; Indianapolis, 10.1; Lincoln, 11; St. Paul, 8.2; Portland, Me., 7.8; Portland, Ore., 8.3; Raleigh, 6; Richmond, 5.8; New York, 14.7; Pierre, 11; Sacramento, 8.1; San Francisco, 10.4; St. Louis, 9.8; Tacoma, 5.7; Topeka, 9.3; Washington, 6.7.

The average hourly velocity at some notable European capitals is: London, 10.8; Rome, 8.5; St. Petersburg, 9.9; Potsdam, 12.3; Prague, 13.

Seamen more than landsmen need to give attention to every variation in the strength of the wind, as well as its direction; and the *Anemometer,* used on land for this purpose, is unsuited to the wants of seamen. They have found it convenient to divide winds into 12 kinds, in relation to strength, designated thus: *faint air, light air, light breeze, gentle breeze, fresh breeze, gentle gale, moderate gale, brisk gale, fresh gale, strong gale, hard gale, storm.* This estimate of the wind's force on the scale 0 to 12, means that 0 represents a calm, and 12 a hurricane, If such estimations be divided by 2, and the quotient squared, the result will be approximately the pressure of the wind in pounds weight.

All wind is caused, directly or indirectly, by changes of temperature. Suppose the temperature of two adjacent regions to become, from any cause, unequal, the air of the warmer, being lighter, will ascend and flow over on the other, while the heavier air of the colder region will flow in below to supply its place. Thus, a difference in the temperature of the two regions gives rise to two currents of air—one blowing from the colder to the warmer along the surface of the earth, and the other from the warmer to the colder, in the upper strata

of the atmosphere; and these currents will continue till the equilibrium be restored.

Recent observations induce the theory that a cold wave descends to the earth from the upper air, making first contact in some far northern latitude, and thence closing down, literally pinching out the warmer, lower strata as it advances, creating a strong wind, as air is expelled by a closing book.

Winds are classed as *Constant, Periodical,* and *Variable Winds.*

CONSTANT WINDS are usually called *Trade-winds.*—When the surface heated is, roughly speaking, a whole zone, as in the case of the tropics, a surface-wind will set in toward the heated tropical zone from both sides, and uniting will ascend, and then, separating, flow as upper currents in opposite directions. Hence, a surface-current will flow from the higher latitudes toward the equator, and an upper current toward the poles. If, then, the earth were at rest, a north wind would prevail in the n. half of the globe, and a south wind in the s. half. But these directions are modified by the rotation of the earth on its axis from w. to e. In virtue of this rotation, objects on the earth's surface at the equator are carried round toward the e., at the rate of 17 m. a minute. But as we recede from the equator, this velocity is continually diminished; at lat. 60°, it is only $8\frac{1}{2}$ m. a minute, or half of the velocity at the equator; and at the poles it is nothing. A wind, therefore, blowing along the earth's surface to the equator, is constantly arriving at places which have a greater velocity than itself. Hence, the wind will lag behind—that is, will come up against places toward which it blows—i.e., will become an *east* wind. Since, then, the wind n. of the equator is under the influence of two forces—one drawing it s., the other drawing it w.—it will, by the law of the composition of forces, flow in an intermediate direction, that is, from n.e. to s.w. Similarly, in the s. tropic, the wind will blow from s.e. to n.w. All observation confirms this reasoning. From the great service that these winds render to navigation, they have been called the Trade-winds. It is only in the Pacific and Atlantic Oceans that the trade-winds have their full scope. In other parts of the trades' zone, such as s. Asia and intertropical Africa and America, they are more or less diverted from their course by the unequal distribution of land and sea (see MONSOON). It is generally stated that in the Atlantic the *North Trades* prevail between lat. 9° and 30°, and in the Pacific between lat. 9° and 26°; and the *South Trades* in the Atlantic between lat. 4° n. and 22° s., and in the Pacific between lat. 4° n. and $23\frac{1}{2}$° s. These limits, however, are not stationary, but follow the sun, advancing n. from Jan. to June, s. from July to Dec.

Region of Calms.—This is a belt, 4° or 5° broad, stretching across the Atlantic and Pacific, parallel to

the equator. It marks the meeting-line of the n. and s. trades, where they neutralize each other. Here also occur heavy rains, and almost daily thunder-storms. This belt varies its position with the trades, reaching its most n. limit in July, and its most s. in Jan. When the belt of calms nears the African coast, in the Gulf of Guinea, the copious rainfall gives rise to the strong steady gales of that coast, called *Tornadoes*.

Periodical Winds. *Land and Sea Breezes.*—These are the most general, as well as most easily explained, of the periodical winds. On the coast, within the tropics, a breeze sets in from the sea in the morning, at first a mere breathing on the land; but gradually it increases to a stiff breeze in the heat of the day, after which it sinks to a calm toward evening; soon afterward a contrary breeze springs up from the land, blows strongly seaward during the night, and dies away in the morning, giving place to the sea-breeze as before. These winds are caused during day, by the land becoming more heated than the sea, when, consequently, the air over it ascends, and the cool air from the sea flows over on the land to supply its place; and during night, by the temperature of the land falling below that of the sea, and the air becoming thereby heavier and denser, flows over the sea as a land-breeze. Within the tropics, sea-breezes are most marked and constant, because there the sun's heat is greatest, and atmospheric pressure is practically uniform, except in the rare instances of its disturbances by hurricanes. Quite analogous to the land and sea-breezes are the Monsoons, which are only the n. trades drawn out of their course in summer by the heated regions of s. Asia—the s.w. monsoon being only a vast sea-breeze blowing on s. Asia and continuing several months of the year.

Variable Winds.—These are characteristic of zones beyond those of the trade-winds, and in general result from the commingling of the cooled and descending anti-trade-winds (the upper current from the equator to the poles) and the surface currents from the north, which, except for this commingling, would have the regular character of trades. But the variableness is continually modified by the great cyclonic movement of storms toward which the winds centre. Besides this, winds are affected more or less by purely local or temporary causes, such as the nature of the ground, covered with vegetation or bare; cultivation, the physical configuration of the surface, level or mountainous; the vicinity of the sea or lakes, etc. Within the tropics, all these are borne down, or almost borne down, by the great atmospheric currents, which prevail there in all their force. But in higher latitudes this is not the case; these, therefore, are the regions where variable winds prevail. The term variable may be applied also to periodic winds characteristic of certain countries. The most noted of variable winds are the Simoom, Sirocco, Solano, and Harmattan.

The *Bora* is a cold tempestuous wind, blowing from the Alps down to the Adriatic; and the *Gregale* is a peculiarly cold, parching, and unhealthful wind, which at certain seasons descends on Malta from Greece. *Mexican wind*, western plains, colloq., a hot south wind, assumed to have originated in Mexican deserts, destructive to vegetation, formerly felt as far n. as national boundary and e. to central Iowa, but so modified by cultivation of large areas and consequent conservation of moisture as to be no longer injurious. *Chinook*, a warm periodical wind, blowing off the Japan current upon the northwest coast of America. In passing over the mountain ranges the moisture is precipitated, and by the time they reach the eastern base of the Rockies the atmospheric pressure has made the wind currents so warm as to greatly modify the climate. The *Puna Winds* prevail four months in the year in a high barren table-land in Peru called the Puna; as they are part of the s.e. trade-wind, after having crossed the Andes they are drained of their moisture, and are consequently the most dry and parching winds that occur anywhere on the globe. In travelling over the Puna it is necessary to protect the face with a mask from the glare and heat of the day and from the intense cold of the night. The *Etesian Winds* are n. winds which prevail in summer on the Mediterranean, caused probably by the great heat of n. Africa at this season, and consist in a general flow of the air of the cooler Mediterranean to the s., to take the place of the heated air which rises from the sandy deserts. The *Mistral* is a steady, violent n.w. wind, felt particularly at Marseilles and in s.e. France, blowing down on the Gulf of Lyons. The *Pampero* blows in the summer season from the Andes across the pampas of Buenos Ayres to the sea-coast: it is thus a n.w., or part of the anti-trade of the s. hemisphere, and so far analogous to the stormy winds which sweep over Europe from the s.w. But since it comes from the Andes over the South American continent, it is a dry wind, frequently darkening the sky with clouds of dust, and drying up vegetation.

Lord Bacon remarked that the wind most frequently veers with the sun's motion, or passes round the compass in the direction of n., n.e., e., s.e., s., s.w., w., and n.w., to n. This is from the fact that by far the greater proportion of the storms of n.w. Europe follow their course to eastward along paths lying n. of the British Islands. Prof. Dove of Berlin first propounded the *Law of the Rotation of the Winds*, and proved that the whole system of atmospheric currents—constant, periodical, and variable winds—obeys the influence of the earth's rotation. See METEOROLOGY; STORMS; CYCLONE; etc.

WIND'BER, Pa.: borough in Somerset co.; on the Pennsylvania and the Johnstown Passenger railroads; about 8 m. e. of Johnstown. It is in an agricultural and coal-mining region, and has extensive coal-mining inter-

ests. The borough is well laid out; it has wide streets paved with brick; and a number of fine buildings. There are three large public schools containing 20 rooms. One building was erected in 1903 at a cost of $50,000. There are two banks; the Windber National Bank has a capital of $50,000. There are seven church buildings, one mission, and a strong Y. M. C. A. organization. The borough has a municipal hall. The government is vested in a burgess and a council of seven members. The expenses annually of the excellent volunteer fire department are $10,000. The Berwind White Coal Mining Co. were chiefly instrumental in establishing the borough, by means of their extensive operations and coal holdings in the vicinity. Nearly all their employees reside in the borough. Windber was laid out for an industrial centre and an ideal residential town. The town was platted by J. S. Cunningham, and in 1900 it was incorporated as a borough. It has water-works, electric lights, and two newspapers. Pop. (1904) 8,000. (1910) 8,013.

WIND CONTUSION: contusion, such as the rupture of an internal organ or the concussion of the brain, or even a comminuted fracture of a bone, caused or supposed to be caused by the rush of air produced by a cannon-ball or other projectile in its flight. Military surgeons so often meet with such cases of injury without any external marks of violence to indicate the stroke of a cannon-ball, that they have been led to the conclusion that solid objects projected with great velocity through the air might inflict such injuries by aërial percussion; the hurt being inflicted either directly by the force with which the air is driven against the part, or indirectly by the rush of air to refill the momentary vacuum created by the rapid passage of the ball. So many observations have, however, been made of cannon-balls passing close to the body (even shaving part of the head, tearing away portions of uniform, or carrying off the external ear or the end of the nose, without further mischief), that this hypothesis is totally untenable, and is now generally rejected. The true explanation of such cases is now thought to rest 'in the peculiar direction, the degree of obliquity with which the missile impinges on the elastic skin, together with the situation of the structures injured beneath the surface, relatively to the weight and momentum of the ball on one side, and hard resisting substances on the other.'

WINDER, *wīn'dėr*, WILLIAM HENRY: American general: b. Somerset co., Md., 1775, Feb. 18; d. Baltimore 1824, May 24. He was graduated from the University of Pennsylvania and became a lawyer in Baltimore. In March, 1812, at the breaking out of the war of 1812, he was appointed lieutenant-colonel of infantry, and was made colonel in July of the same year. He led a successful expedition from Black Rock to the Canada shore 1812, Nov. 28; was promoted to be brigadier-general in

March, 1813; appointed adjutant and inspector-general in May, 1814; commanded at the battle of Bladensburg, and the unsuccessful defense of Washington in August, 1814; and was honorably discharged in June, 1815. He then resumed his law practice, and was subsequently a member of the Maryland senate.

WINDERMERE, or WINANDERMERE, England; a lake in Lancashire and Westmoreland, about 11 m. in length, and from one-third of a mile to a mile in width, its area being a little over 5 sq.m.; its depth varies from 30 to 240 ft. Its outlet is the river Leven, which discharges its waters into Morecambe Bay. The lake is surrounded by gentle, well wooded eminences, and the neighborhood is noted for its beautiful scenery, celebrated by the Lake poets, Wordsworth, Coleridge, and Southey. Wordsworth lived at Rydal Mount, about 2 m. from the head of the lake. Windermere, pop. (1901) 2,379, is a small town near the e. shore.

WIND-FLOWER: the delicate *Anemone nemorasa, A. quinquefolia,* and other members of this genus of the *Ranunculaceæ,* so-called because the ancient Greek name of some plant associated in Greece with the winds has been given to the *Anemone,* or because the little plants bloom when spring winds are rampant. The two species mentioned send up an early flowering stem, bearing about its centre a whorl of three digitately divided leaves; above them is a solitary white-petaled starry flower, often tinged with shell-pink on the outside. They expand fully only in sunshine, and nod with half-closed corollas on cold, dark days, and at night. The plants choose mossy stumps in swamps, or damp thickets for their habitat, and have large basal leaves later in summer. On the prairies the red wind-flower (*A. multifida*) and the pasque-flower (*A. patens varnuttalliana*) bear this name. Another European wind-flower is *Gentiana pneumonanthe,* a low, blue-flowered marsh plant.

WINDHAM, Conn.: a town in Windham co., 33 m. e.n.e. of Hartford, on a division of the New York, New Haven and Hartford railroad. The township comprises the city of Willimantic and two or three small manufacturing villages, which have water-powers on the Shetucket river. Pop. (1900) 10,487; (1910) 12,604.

WINDHAM, WILLIAM: English orator and statesman: b. London 1750, May 3; d. there 1810, June 4. He was educated at Eton, Glasgow, and Oxford, and was returned to parliament as member for Norwich in 1784. During the early part of Pitt's administration he sat in the opposition, but during the course of the French revolution joined Burke in condemning the revolutionary principles, and advocating the war that Pitt declared against France. He was secretary-at-war in Pitt's cabinet 1794-1801, and under the Fox and Grenville ministry, which came into office in January, 1806, held the

rank of colonial secretary. During his tenure of office, which continued till March, 1807, he brought in and succeeded in passing against strenuous opposition, a measure for reducing the duration of the period of enlistment for soldiers, and making various provisions for improving the condition of the soldier. Windham was a man of thoroughly independent character, but his independence sometimes passed over into eccentricity. A collection of his speeches with a *Life* by Amyot, was published in 1806; his diary, edited by Mrs. Baring in 1866.

WINDHOEK, southwest Africa: the capital of the Protectorate of German Southwest Africa, situated in the Awas Mountains at an elevation of 5,350 ft.; about 235 m. by railroad from the coast. The population is about 600. The town has several hot springs, and is a health resort for the German officials of the district, who constitute more than nine-tenths of the white inhabitants, of whom there are about 1,200, in the midst of a savage population of more than 45,000.

WIND'HOVER: a name in Great Britain for the kestrel, referring to its habit of holding a stationary position facing the wind, while it searches the ground beneath it for indications of prey.

WIND'-INSTRUMENTS: musical instruments in which the sounds are produced by agitation of an inclosed column of air. They are classified into *wood instruments* and *brass instruments* (both played by the breath), and the *organ*.

The name *wood instruments* includes those made of ivory. The principal *wood instruments* are the flute, piccolo, clarionet, flageolet, basset-horn, oboe, and bassoon. They are generally characterized by a soft, smooth, aërial tone, resembling the human voice. By the use of holes and keys, considerable compass is given to them; they are capable of producing only one sound at a time, but with considerable command of piano and forte. Of *brass instruments* the chief are the horn, trumpet, trombone, cornet-a-piston, euphonium, bombardon, and ophicleide. They are generally more powerful, and their quality more piercing than wood instruments; the ophicleide, however, approaching more than the rest to wood instruments in capabilities and tone. In a full orchestra there are generally two flutes, two oboes, two clarionets, two or four horns, and two bassoons, frequently with the addition of two basset-horns, one or two piccolos, and one or two ophicleides or trombones. Each part, except when there is an unusually large number of bow-instruments, is single.

The organ is a combination of a large number of wind-instruments, sounded, not by the breath, but by admission of air into the wind-chest, by means of keys pressed down by the performer.

WINDLASS, n. *wĭnd'las* [Icel. *vindass*, a windlass—from *vinda*, to wind, and *ass*, a pole: Dut. *windas*, a windlass—from *winden*, to wind (see WIND 1)]: a machine for raising heavy weights, being a modification of the *wheel and axle;* in *OE.*, the handle by which anything was turned; a kind of winch used in bending a cross-bow: also, a circuit or circuitous path; hence, wile; trickery.—The *Windlass* in its simplest form consists of an axle supported by pivots on two strong upright pieces, and pierced near one end with four or six square holes, into which handles, known as *hand-spikes*, are

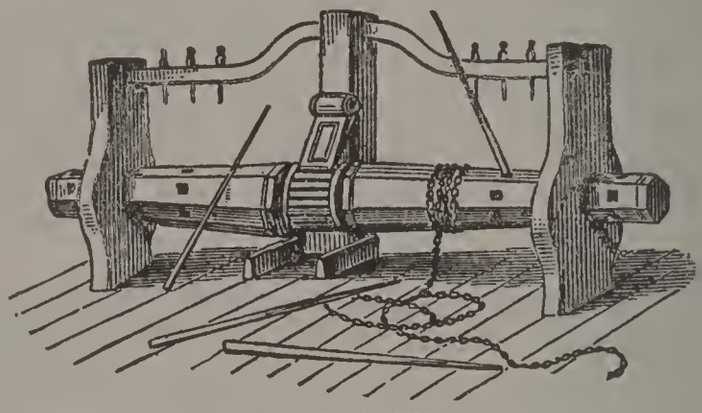


Fig. 1.—Ship's Windlass.

inserted. In other forms, a Winch (q.v.) at each end is substituted for the handspikes. If the weight (say a bucket of water) is to be lifted a considerable distance, the length of the rope which attaches it to the axle largely increases the weight, and thus aids the power when descending, and counteracts it when ascending. This difficulty is partially overcome by employing a double rope with two buckets, one of which ascends while the other descends; but this modification, though partially effective for the end in view, lends aid to the power when aid is least required, and hinders it when aid is most required. A more efficacious plan is to form the axle not cylindrical, but of a barrel-shape, like two truncated cones placed base to base, and to fasten two ropes, one to each end, so that when coiled up around the barrel they approach the middle; in this case, when one rope is fully uncoiled, and winding up commences, the gross weight, which is then at its maximum, acts at the minimum leverage of the end, and as the progress in winding up diminishes the weight, its leverage so increases that the momentum is preserved uniform. On the other hand, the empty bucket, as it begins to descend, acts at its greatest leverage, and as the unwinding of the rope adds to the weight, its leverage becomes smaller, so that the momentum of the descending weight always remains the same: thus the strain on the power is preserved uniform. It is sometimes found necessary greatly to increase the ratio of the weight to the power; but with the ordinary windlass this could be effected only by similarly increasing the ratio between the leverage of the handle and the radius of the axle—an object attained by a great increase of the former, render

ing the machine too cumbrous; or by greatly diminishing the latter, and so weakening it. The desired result is attained, however, in a manner not liable to these objections, by the use of the *differential axle* (fig. 2), an axle of which one half is of greater diameter than the other, and the single rope, after being coiled round the whole axle from end to end, is fastened at each end of the axle, and the weight is hung by a pulley, which is supported in a bulge in the centre of the rope. As the portion of the rope on one half of the axle is unwound, that on the other half is wound up; but since the rates of winding and unwinding are different, the bulge of the rope increases when the rope is wound *on* the smaller end of the axle, and decreases when it is wound *off* the smaller end. The more nearly equal the two radii of the axle are, the greater is the weight which can be raised by the power—the ratio between the two being

Fig. 2.

$$\frac{W}{P} = \frac{\text{radius of circle described by power}}{\text{difference of radii of the portions of the axle}}$$

so that if the radius of the power is 18 in., and the radii of the axle are 5 and 4 in., the power balances a weight = 18 times itself; while the strength of the axle requires to be equal only to that of one of the ordinary kind, in which the power can balance a weight only = 4½ times itself. The same principle is applied to the Screw (q.v.). For a very accurate estimate of the mechanical advantage of the windlass, the thickness of the rope must be taken into account, by adding half its diameter to the radius of the axle.

WINDLE-STRAW, n. *wĭn'dl-* [*straw* for *winding* or plaiting]: a stalk of tufted hair-grass, dog's-tail, or other grass, when old and dry.

WIND'MILL: mill for grinding, sawing, pumping, or for performing any other species of work in which fixed machinery can be used—the motive-power being the wind acting on a set of sails. The structure is a conical or pyramidal tower of considerable height, covered at the top with a species of dome, *aaa* (fig. 1), which is so fastened as to revolve upon it round the upper extremity of the shaft *c*, as a centre, the motion being aided by the interposition of 'castors' between the wooden rings which form respectively the base of the dome and the top of the tower; the sails, *b*, *b*, are attached to the extremity of the axis *d*, so as to revolve in a plane at right angles to it, and the motion that they communicate to the axis is transferred by the bevelled wheels *e* and *f* to the upright shaft *c*, by which it is in turn conveyed to the working machinery at the bottom of the tower. The axis *d* of the sails, which is inclined at an angle of about 10° to the horizontal, is fixed at one end to a projection from the top of the shaft *c*, and at the other to a circular orifice in the side of the dome, so that it re-

volves with the latter, carrying the sails with it; this arrangement is adopted to enable the plane of rotation of the sails to be placed always at right angles to the direction of the wind. This transference of the plane of rotation was effected formerly by manual labor applied to a winch at

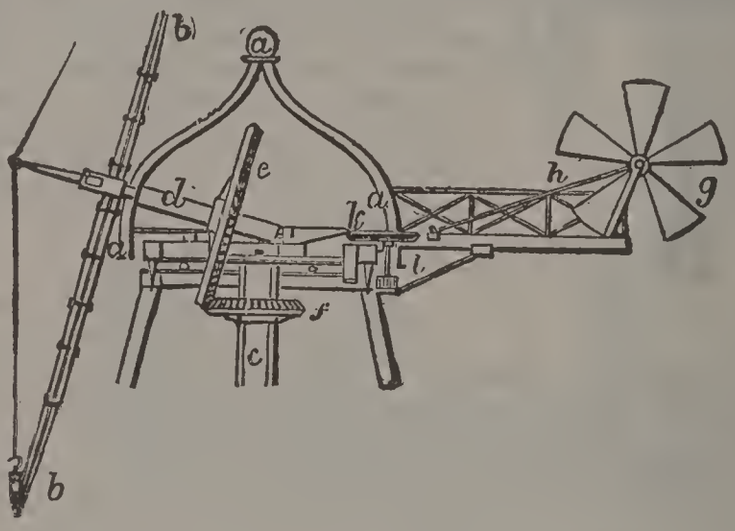


Fig. 1.

the bottom of the tower—the rotation being communicated. by an endless band and wheel-work above, to the dome, the outer circumference of whose base was, for this purpose, furnished with a circle of rack-work. But this clumsy arrangement was superseded by an ingenious contrivance, by which the wind itself was made to turn the sails into their proper position. The apparatus by which this is effected consists of a revolving *flyer* or fan, *g*, projecting from a gallery fastened to the dome on the side opposite to the sails; *h*, a long thin shaft to which a revolving motion is communicated by a toothed wheel on its outer extremity, from a corresponding wheel on the axis of the flyer (these wheels are not seen in the fig., being behind the flyer); a pinion at the other end of the shaft acts on the cog-wheel *k*, which carries, on the lower extremity of its axis. a pinion *l*, and this last can at pleasure, be put into gearing with the rack-work or cog-circle on the lower edge of the dome. The construction of the sails, four in number, is shown in fig. 2. Each sail consists of a *whip* or radius 33 to 40 ft. in length, firmly fastened at right angles to the sail-axle, and pierced at from $\frac{1}{6}$ or $\frac{1}{7}$ of its length from the axle to its extremity with about 20 holes, into each of which is inserted a cross-bar 5–6 ft. in length; and this frame-work, strengthened generally by light rods connecting the ends of the cross-bars, is then covered with canvas.

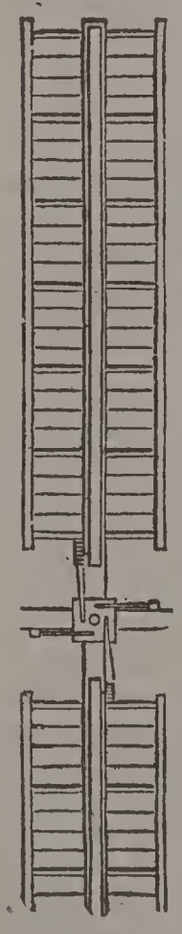


Fig. 2.

The cross-bars, however, are not, as in the figure, set in the plane of revolution of the whips, for, in that case, the wind, acting in a direction coinciding

with that of the sail-axle, would impinge perpendicularly on the sails, and no rotatory motion would result; the bars, therefore, are set at an angle to this perpendicular direction, yet not all at the same angle, for the velocity of each point of the sail increasing with its distance from the sail-axle, the inclination must vary from the first cross-bar to the outer extremity. It is found that a variation of the angle from 18° at the first cross-bar, to 7° at the extremity, is a very effective form. The amount of sail that a windmill can carry with advantage is limited, according to some authorities on this subject, to $\frac{7}{8}$ of the area of the circle described by one whip: the velocities of a sail, when unconnected with, and when producing its maximum effect on, the machinery below, are as 3 to 2; also, the increase of useful effect varies with the square of the wind's velocity, and is proportional to the cube of the length of the whip, in sails of similar form. A windmill with sails of 40 ft. radius is equivalent to 65,000 foot-pounds per minute. Another species of windmill, known as a horizontal wind-mill, is a large circular frame of wood which rotates on a vertical axis, and carries a set of sails which revolve in a horizontal plane. According to Sir David Brewster, the power of a horizontal mill is only about one-third or one-fourth of that of a vertical mill, the number and size of the sails being equal in each. An ingenious form of horizontal windmill was patented by Giraudat of New York 1861: its peculiarity is in the sails, which are hinged in such a way that the force of the wind acting on one face preserves their perpendicularity to it, and secures a maximum effect, but when, after a further semi-revolution, the other side is presented to the wind, they are raised to a horizontal position. Most of the recent improvements in windmills have had for their object the regulation of the sail-area exposed to the wind to counterbalance the variations in the latter's force, and so produce uniformity of motion; but these are too numerous to be here noticed.—Windmills were introduced into Europe from the Saracens, and were formerly extensively used in England: they are still common in the midland and southern districts; on the continent, especially in Holland and France; and abound in the United States.

WINDOM, *win'dom*, WILLIAM: statesman and financier: 1827, May 10—1891, Jan. 29; b. Belmont co., O. He began to practice law in Mount Vernon, O.; was prosecuting atty. for Knox co. 1852; removed to Minn. 1855; and was mem. of congress 1859–69, with chairmanship of committees on Indian affairs. In 1870 he was appointed U. S senator to fill a vacancy, was elected senator for the full term 1871–77, and re-elected for the next term, but resigned 1881 to accept the secretaryship of the treasury. On the death of Pres. Garfield, he resigned this office, and by new election filled his own vacancy in the senate. In 1889 he again became sec. of the treasury, under Pres. Harrison. He died suddenly at the conclusion of an able and conservative speech on the national currency, at a dinner given him at Delmonico's, New York. His death was felt to be a great public loss.

WINDOW, n. *wĭn'dō* [Icel. *vindauga;* Dan. *vindue,* a window: literally *wind-eye,* an opening to admit the air: Icel. *auga,* an eye (see WIND 2 and EYE)]: an opening in a building, fitted with a frame, in which are placed sashes, usually movable, filled with glass, as in western countries, or covered with paper, as in China, Japan, etc., for the admission of light and incidentally of air; an aperture or opening; a lattice or casement: V. to furnish with windows; in *OE.,* to place at a window. WIN'DOWING, imp. WIN'DOWED, pp. *-dōd:* ADJ. having many openings or rents. WIN'DOWLESS, a. *-lĕs,* being without windows. WIN'DOW-BLIND, a blind, screen, or shade, intended to intercept or modify the sun's rays, or for greater privacy of those within. WIN'DOW-FRAME, the frame which receives the sashes. WIN'DOW-GLASS, glass used for glazing windows. WIN'DOW-SASH, the light frame in which panes of glass are set for windows.

WIN'DOW: opening in the wall of a building for admission of light and air. In the East, from time immemorial, windows open not on the street, but on the inner court, and are usually provided with lattices or jalousies. The Chinese and Japanese use, instead of window-glass, a thin varnished paper. Among the Romans windows were originally closed with shutters; afterward they were made of a transparent stone, *lapis specularis,* which, from the description, was probably mica; and in the 2d c. after Christ, of horn. According to some, there are traces of glass windows having been used in Pompeii; but this is doubtful. The first indisputable mention of glass windows is by Gregory of Tours, 4th c., who speaks of church windows of colored glass. Wilfrid (q.v.), on succeeding to the bishopric of York 669, filled the vacant windows of the cathedral with glass. In 674 Abbot Benedict Biscop brought artists from France to glaze the windows of the Abbey of Weremouth; and the bp. of Worcester did the same 726. Leo III., end of the 8th c., put glass windows into the Church of the Lateran, Rome. Glass began to be used in windows of private houses in England as early as 1180; in France in the 14th c. As late as 1458, Æneas Sylvius was surprised to find that in Vienna most of the windows were glazed. See GLASS.

In ancient temple architecture, windows were unknown —the light being obtained from openings in the roof. In Gothic architecture, the window is one of the most important features, giving, by the infinite variety of its outline and the graceful forms of its tracery, as much character and beauty to the Gothic edifices as the styles and colonnades of ancient art gave to the classic temples.

In the early Gothic or Norman style, the windows were small, and were either simple openings with semicircular head, or two such grouped together with a larger arch over both, and with the usual moldings and ornaments of the style (fig. 1). The inside had generally a deep splay, and simple molding on the outside. Small circular windows sometimes occur in Norman work.

In the Early English style, the windows were more

elongated, and had pointed arches. They are frequently grouped in twos or threes, and placed so close that the wall between becomes a mullion. The wall over the group contained within the inclosing arch then becomes perforated with a quatrefoil or other ornamental opening, and thus the simpler forms of tracery become introduced. The interior arches are splayed off, and are frequently elaborately decorated with shafts and arch moldings. The lancet window (named from its shape) is common in this style. Circular windows also are used with tracery formed by little radiating shafts with small arches. The triangular window, on a small scale, is occasionally seen.

Fig. 1.—Bucknell, Oxford.

In the Decorated style the windows become enlarged and filled with mullions and tracery. This is at first simple, and composed of geometric figures such as the origin and progress of Tracery (q.v.) naturally led to. As the style advanced, more flowing forms were introduced, until, in the 15th c., the tracery passed into the Perpendicular Style (q.v.) in England, and into the Flamboyant (q.v.) in France. The heads of the lights, and the apertures in the tracery, are usually foiled, and the inner jambs are splayed and ornamented with moldings, shafts, etc. (fig. 2). In elaborately traceried windows the jamb and arch moldings are occasionally very small, but they are usually bold and deep.

In the later Tudor style the window-heads became flattened into the four-centre arch; and in the time of Elizabeth and James I. the arch gave place altogether to the flat lintel with the opening divided by mullions into rectangular lights, sometimes foiled at top. Circular windows, with elaborate tracery, are found chiefly in the Decorated period.

In domestic buildings the windows are similar to the above, but square-headed windows occur more frequently, to suit the height of the floors; and the space between the

sill and the floor is recessed and fitted with seats. Transoms also are common. The bow or bay window (see BAY-WINDOW) is a frequent and elegant feature in later Gothic buildings.

In the revived Classic styles the windows are almost invariably plain rectangular openings, with either a flat

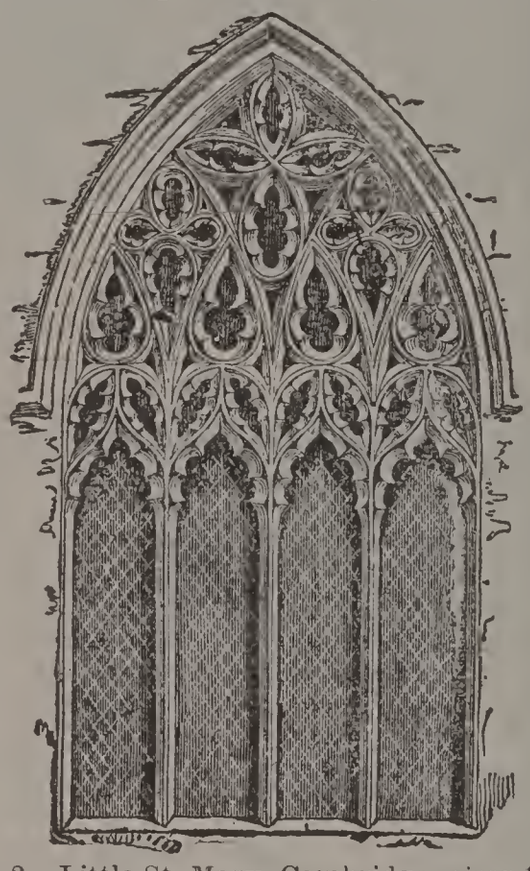


Fig. 2.—Little St. Mary, Cambridge, *circa* 1350.

lintel or semicircular arch-head. They have sometimes architraves round the jambs and lintel, or are ornamented with pillars supporting an entablature or pediment above. The architraves are frequently carved, and the cornices carried on trusses at each side.

A tax on windows, levied in England 1695, was abolished 1851.

WINDSOR, *wĭn'zẽr*, properly NEW WINDSOR: municipal and parliamentary borough of Berkshire, England; on the right bank of the Thames; 23 m. w.s.w. of London. W. and Eton, on the opposite bank of the river, form one town, though they belong to different counties. The town is interesting chiefly as the scene of *The Merry Wives of Windsor*, and for the antiquity of its castle and parks, which have been a favorite residence of English monarchs since the time of William the Conqueror. The elevated plateau of natural chalk on which it stands marked it out, no doubt, as a naturally strong place; but the deficiency of water which such a position entailed was a serious objection to its being adopted as a permanent residence. The older palace of the English kings was at *Old* Windsor, about 2 m. distant, and considerable doubt seems to exist among antiquaries and historians as to the first Eng-

lish king who built solid work of masonry at Windsor Castle. In the time of Edward the Confessor it was probably a wooden structure, as stone was difficult to be had, and wood was abundant. William the Conqueror probably built the first substantial stone buildings, and regularly fortified the place; but the absence of water, except what was carried to it from the Thames, must have long been a serious drawback to its importance as a military station. The history of the existing castle begins in the reign of Henry III. The buildings may be said to be grouped in three portions—the Middle Ward, containing the Round Tower; the Lower Ward, on the w., containing St. George's Chapel, the houses of the Military Knights, cloisters, etc.; and the Upper Ward, on the e., containing the sovereign's private apartments. The chapel, which was begun by Henry III. and completed by Edward III., was rebuilt by Henry VII. and added to by Cardinal Wolsey. Under this chapel is the burial vault of the present royal family. The Round Tower, formerly believed to be Norman, but in which there is not a single yard of Norman masonry, was built in the 18th year of Edward III. to receive the Round Table of the knights of the newly founded order of the Garter. The park and forest immediately adjoining cover 13,000 acres, and contain many historic trees, such as Elizabeth's Oak; Shakespeare's Oak; the Long Walk, made in the reign of Charles II.; and Queen Anne's Ride of Elms, 3 m. long. Herne's Oak, rendered famous by Shakespeare, was blown down 1863, Sept., and a stone and young tree now mark the spot. The oldest planted timber in England—viz., that of the reign of Elizabeth—is in Windsor Park, and there are many oaks whose age must be 1,000 years. In 1790 the royal forest at Windsor contained about 60,000 acres. Pop. (1900) 13,958.

WINDSOR, Canada: a seaport town, capital of Hants co., Nova Scotia, on an inlet of Minas Bay, and on the Windsor and Annapolis railway, 45 m. n.w. of Halifax. Its chief institution is King's College (q.v.), or Windsor University, founded in 1788. It is a busy shipping port, is electrically lighted, and has a considerable export trade in the gypsum and limestone of the region. Pop. (1901) 3,398.

WINDSOR, Canada: the largest town in Essex co., situated on the banks of the Detroit river, opposite the city of Detroit. Five railways enter the city, including the Grand Trunk, Canadian Pacific, Michigan Central, Wabash, and the Ontario division of the Pere Marquette. The location makes Windsor one of the desirable residential cities of the continent. It has 10 churches, 10 schools, a collegiate institute, and St. Mary's academy. The chief manufactories are the Canadian Salt Co., paint and varnish works, sash, door and planing factories, boiler works and machine shops, with various minor industries. It has several miles of paved streets and an

adequate sewerage system. There is a rapid increase in population, which at the present time (1905) is 14,000.

WINDSOR, Conn.: town in Hartford co.; on the Connecticut and Farmington rivers, and on the New York, New Haven and Hartford railroad; 6 m. n. of Hartford. It is in an agricultural section in which the chief products are vegetables, fruit, and tobacco. The principal manufactures are worsted goods, paper, electrical motors, knit goods, tobacco products, and dairy products. The educational institutions are the Hayden Hall-Home School for Girls, a town high school, kindergartens, 10 public schools, and a public library.

The first settlement was made in 1633 by William Holmes and companions from Plymouth. They established here a trading post. In 1635 Roger Ludlow and a colony from Dorchester, Mass., settled near the trading post and called the place Dorchester. In 1637 the name was changed to Windsor. In 1639 Windsor united with Hartford, and Wethersfield, under 'Fundamental Orders,' to form the commonwealth of Connecticut. Pop. (1900) 3,614; (1910) 4,178.

WINDSOR-CHAIR: n. strong, plain chair made entirely of wood, seat and back; a sort of low wheel-carriage.

WINDSOR LOCKS, Conn.: town in Hartford co.; on the Connecticut river, and on the New York, New Haven and Hartford railroad; about 12 m. n. of Hartford. It was a part of the town of Windsor until 1854, when it was set off and incorporated. It is a manufacturing town; extensive water-power is obtained from the Connecticut by means of a canal. The chief industrial establishments are paper mills, cotton yarn and thread factories, a foundry, machine shops, steel works, and silk factories. Other manufactures are furniture, trucks, school globes, and carpet-loom chains. In 1900 (government census) Windsor Locks had 37 manufacturing establishments, capitalized for $2,117,159; the annual output of which was valued at $1,311,768. The principal public buildings are Memorial Hall, presented by Charles E. Chaffee to J. H. Converse Post 67, G. A. R.; four churches, and the public and parish schools. It has one bank. Pop. (1900) 2,997; (1910) 3,715.

WINDTHORST, Ludwig: parliamentary leader: 1812, Jan. 17—1891, Mar. 14; b. Kaldenhof, Hanover. He made his preparatory studies in the Carolinum at Osnabrück; studied law at Göttingen and Heidelberg universities, and entered the legal profession. He became Oberappellationsrath in Celle 1848, and a member of the second Hanoverian chamber 1849, there from the first defending the same principles regarding the relations of church and state to which he steadily adhered till death. He became leader of the ministerial party, president of the second chamber, and minister of justice 1851. He

resigned his place in the cabinet 1853, and became again a simple member of the second chamber. Again he was chosen to a place in the government as minister of justice 1862. After Hanover was annexed to Prussia, Windthorst conducted the negotiations with Bismarck in regard to the compensation to be made to the deposed King George for the loss of his crown. In the field of Prussian and German politics Dr. Windthorst found larger opportunity for his remarkable talents. In 1867-71 he was a member of the N. German diet and of the Prussian house of deputies; 1871 he was a member of the first diet of the new German empire, and subsequently of the Prussian house of deputies: in both these bodies he was from the beginning the recognized leader of the party of the centre, or Roman Catholic clerical party. His mastery of parliamentary law, his acuteness of intellect, piercing wit, and readiness in debate, aided always by the perfect discipline of his party, made him a dangerous and harassing opponent of the government; his parliamentary strategy and tactics were equal to every emergency, and he never hesitated to make alliances with any of the heterogeneous fractional or factional parties, whether of the left or of the right. For 16 years Dr. Windthorst led the struggle against the Kulturkampf and the 'May laws,' and saw those laws cancelled in every essential feature two years before he died.

WINDWARD ISLANDS: a group of the West Indies forming the southern part of the Lesser Antilles, including St. Lucia, St. Vincent, Grenada, and the Grenadines. They are of volcanic origin, the larger islands are mountainous; the lower levels being generally fertile and producing sugar, cocoa, and spices; logwood and other timber are also obtained. They belong to Great Britain; the governor resides at St. George's, Grenada. The islands have no common legislature, laws, or tariff; but there is a common court of appeal, and they unite for other purposes. See also the names of the individual islands of the group.

WINE, n. *wīn* [L. *vīnum;* Gr. *oinos;* Goth. *vein;* Icel. *vín,* wine]: the fermented juice of grapes; the state induced by excessive use of the fermented juice of the grape; intoxication; the juice of other fruits prepared in imitation of wine; in *pharmacy,* a solution of a medicinal substance in wine, as *wine* of ergot. WINY, a. *wī'nĭ,* resembling wine in flavor or quality. WINE'LESS, a. *-lĕs,* without wine. WINE'BAG, *familiarly,* one accustomed to drink large quantities of wine. WINE'-BIBBER, a hard drinker of wine. WINE'-BIBBING, the act or practice of drinking much wine. WINE'-COLORED, a. approaching the color of red wine. WINE'-BISCUIT, a sweet fancy biscuit served with wine. WINE'-CELLAR, a vault or cool place for keeping wine in. WINE'-COOLER, a vessel for cooling wine before it is used; a stand containing ice into which wine in bottles is placed to be cooled; another form consists of a

porous vessel of earthenware, which when wetted evaporates rapidly, absorbs heat from the wine, and so cools it. WINE'-DECANTER, a clear glass bottle for holding wine at table. WINE'-FAT, or -VAT, the vessel into which the grape-juice flows from a wine-press. WINE'-GLASS, a glass from which wine is drunk. WINE'GLASSFUL, as much as a wine-glass will hold; in medical prescriptions, about two fluid ounces. WINE'-MERCHANT, one who sells wine. WINE'-PRESS, a machine or place where the juice is pressed out of grapes.

WINE AND WINE-MAKING: it may have been design, but it was probably an accident, that first led man to crush or to press grapes in order to obtain a palatable and stimulating beverage. As long as the juice is confined within the grape, it becomes sweeter and sweeter as the fruit grows riper and riper. But when the skin is broken by crushing or pressing, and when the juice is allowed to remain a short time exposed to warmth and air, it changes its character and develops new and unsuspected qualities or properties.

The series of changes from the fresh grape juice to an alcoholic drink may be best illustrated by describing the process briefly as follows:

When the juice, or 'must,' is exposed to temperatures ranging from 59° F. to 65° F. the liquid very soon begins to become turbid, small bubbles collect on the surface and the grape skins, stems, and other solid particles, form a dense cover or 'cap' on the top. Carbonic gas, which is developed in increasing quantities, escapes with a loud bubbling sound, and, as the temperature rises, the juice appears as though it were really boiling. After a few days, and sometimes after a few hours, the ebullition subsides and gradually the crust and undissolved substances fall to the bottom. Meanwhile, the must has lost its sweetish taste, and its original character and chemical composition; among other things, it has acquired a richer, deeper color, a vinous flavor and odor, and a certain amount of alcohol.

This interesting natural process, which leads to the formation of alcohol, was described by the term 'fermentation,' from the Latin *fermentum*, the root word being *fervere*, to boil. This feature of the phenomena, whereby the evolution of the gas makes the liquid appear to boil, evidently struck the early wine-makers and natural philosophers as most important. It was a long time before the true nature of the process of vinous or alcoholic fermentation was clearly perceived and properly understood.

Early in the last century (from 1810-25) chemical analyses by Gay-Lussac, Thénard, and De Saussure fixed accurately the composition of sugar in the must and of alcohol in the wine. In 1835 Cagniard de Latour found that the globules were definite organisms, capable of reproducing themselves by budding, and thus apparently

belonging to the vegetable kingdom. He came to the conclusion that, in the course of vegetation, these globules, or 'ferments,' disengaged carbonic acid gas and converted the liquid into an alcoholic liquor.

This discovery, which is at the basis of the modern principles and practices of wine-making, was confirmed two years later (1837) by Schwann at Jena and Kützing at Berlin. The newly-found organism was regarded by some as belonging to the fungi and by others to the algæ. Meyen showed that the organism was a fungus, and established a new genus for it under the name of *Saccharomyces*. In other words, the agents of alcoholic fermentation are called 'yeasts' and belong to the order *Saccharomyces*.

Recent Researches in Alcoholic Fermentation.—The work of the great chemist Pasteur threw a flood of light upon the whole process of fermentation. His investigations extending over a series of years were first summed up in his *Studies on Wine* (Etudes sur le Vin), published in 1872, and further in his book, *Studies on Beer* (Etudes sur la Bière), published in 1876.

To Pasteur belongs the honor of establishing beyond question that fermentations were the work of infinitely small organisms called 'microbes.' He classified and described many of these micro-organisms. He divided them into two classes: aerobic, those which cannot live without the presence of free air; and anaerobic, those which can exist in the absence of air. The former saccharomyces are found at or near the top of the liquid during fermentation; the latter are at work lower down in the body of the liquid.

The microscopical examination of the agents of alcoholic fermentation has revealed quite a number of different forms and varieties. Some 25 or 30 types of the genus *Saccharomyces* have been identified.

The question may very naturally be asked: Where do these yeast organisms come from? Pasteur showed very clearly that the ripe grape is covered with a mass of micro-organisms. These microbes collect on the fruit and stems, and constitute the 'bloom' of the grape. Just why they should fix themselves on the fruit, and remain, as it were, in readiness to be transformed from their dormant state to one of great activity when carried into the juice of the fruit is a mystery. At the same time a great number of other and less desirable yeast cells (bacteria) become submerged in the grape juice, or must, and these foreign yeasts are the ones that give the wine-maker trouble, and lead to many diseases of wine.

Cultivated and Selected Yeasts in Wine-making.—A brilliant Danish chemist, Emil Chr. Hansen, took up the study of alcoholic fermentations and 'disease ferments,' where Pasteur left off. He brought out many new facts with regard to the many different races or species of *Saccharomyces*, which gave very different characters to

beers. Hansen found that it was practical to separate and cultivate the better species or races of brewer's yeasts. With great skill and much care he was able to select two varieties of 'low' yeast and then he worked out a method for the pure cultivation of yeast.

The use of pure cultivated yeasts has been attended with good results in wine-making. Musts have been prepared with pure yeasts and have been compared with musts fermented at the same time without such yeast. In most cases the pure-yeast wine has been regarded as superior to the other. One practical value of employing pure cultivated yeasts in wine-making is that under proper conditions they will control the progress of fermentation, and thus overcome the influence of the undesirable organisms in the must, such as mold-fungi, wild yeasts, bacteria, and mycoderma. By using selected yeasts from celebrated vintages, wine-makers have been able to obtain finer flavors and bouquets, all of which adds to the quality and value of their product.

Fermentation and Enzymes.—In order to grasp and properly understand the various problems connected with the phenomena of fermentation, it is necessary to say something about its relation to enzymes. The term 'enzyme' is now used to indicate the *soluble* ferments secreted or formed in the yeast cell. Pasteur's theory makes fermentation a vital act, depending on a living organism. Recent discoveries show fermentation to be also a chemical act. A few years ago the German chemist, Büchner, proved that alcoholic fermentation can be carried out by a soluble ferment which is extracted from the yeast cell. So that we can have the phenomena of fermentation without the growth and multiplication of yeast cells. To this enzyme in the yeast extract Büchner has given the name *zymase.*

The effect of these recent discoveries in fermentation may be very great and far-reaching, and just what practical form they will take in wine-making and other industries it is impossible to predict.

The Vintage.—The word 'vintage' has come to have quite a wide signification. It may be used to include three distinct steps: (1) the gathering of the grapes; (2) the processes of fermentation, and (3) the general cellar operations connected with the care and handling of the new wine.

The practices of wine-makers are different in different countries, and in different localities of the same country. This is owing to difference in soils, climates, conditions, varieties of grapes used, and in the kinds or types of wines to be produced. And yet, the main principles which give the best results in practice in one country are practically the same in any other country where wine is made.

It should be borne in mind, however, that wine-making is partly an art and partly a science. As such, it cannot

ing extracted from the skins during fermentation. The coloring matter is purplish blue, but is changed to red by the acids in the must. White wines are produced from both white and colored grapes. In order to avoid dark color, the must is quickly separated from the skins and other solid parts of the grape. The making of white and other special wines requires special treatments, which need not be here described. The following is briefly the method of vinification of red wines:

Crushing.—The ancient method consisted in tramping the grapes with the bare feet or with heavy boots in a big trough from which the juice ran as it were expressed. While this old-fashioned method still obtains in a few districts in Europe, it has been superseded there and in this country by machines, which are called 'crushers.' There are several kind of mechanical crushers, but the type most generally used consists of a hopper beneath which revolve two grooved cylinders.

The grapes when dumped into the hopper are then crushed between the rollers, which only break the skins without crushing the seeds. They next pass into the stemmer.

Stemming.—Formerly done by hand, or by a rake over a sieve or screen, the stems are now removed by machines in a very ingenious manner. The grapes after passing through the crusher fall into the stemmer. The stems are carried to one end of the machine, where they are discharged; the seeds, skins, pulp, and juice escape through the bottom, and are conveyed by chutes into the fermenting tanks, which are usually on the floor underneath.

Stemming has its advocates and opponents. The advantages claimed for stemming are that it facilitates the free access of air and so helps the fermentation, especially in case of damaged vintages; that stemmed wines have more *finesse* and are more alcoholic than wines from unstemmed grapes. In the south and southwest of France wine-makers seldom stem their grapes. As a rule grapes are stemmed in the leading wineries in our eastern states and in California.

Fermenting Tanks or Vats.—These are generally made of oak, although in California redwood has been generally adopted. The capacities of fermenting tanks vary from 1,000 to 10,000 gallons, or more.

There is a difference of opinion among wine-makers as to whether the must should be fermented in open or in closed vats. For open vats it is claimed that the fermentation is generally more rapid and complete, the wine is better colored, etc. Against the open vat, it is urged that, the exposure to the air transforms the alcohol in the 'head' or cap, which is raised to the top by fermentation, into acetic acid, and thus injures the wine. An easy way to overcome this objection is by having a false head resting on the cap, and thus keep it sub-

some of them may rise to double the average quantity above given, or may fall, in some cases, to one-fourth of it. In brief, the composition of the must varies according to the variety of grape, degree of maturity, kind of soil, climate, etc.

After water, grape sugar, or glucose, is the most important element of the must. By the agents of fermentation, it is transformed principally into alcohol and carbonic acid. The transformation is represented by the following chemical formula:

$$\underset{\text{Grape sugar.}}{C_6H_{12}O_6} = \underset{\text{Alcohol.}}{2C_2H_6O} + \underset{\text{Carbonic anhydride.}}{2CO_2}.$$

There remains a very small proportion of glycerine and succinic acid, and matters dissolved in the liquid. According to Pasteur, 100 parts of glucose yield through fermentation: Alcohol, 48.46; carbonic acid, 46.67; glycerine, 3.20; succinic acid, .61, and other substances left, 1.03.

The organic acids and acid salts, while they exist in very small proportions, have great influence on the course of fermentation and the quality of the product. The must of grapes picked too soon will contain an excess of acids and a corresponding lack in sugar; while in overripe grapes there will be much sugar but a deficiency in acids. Therefore, wine-makers endeavor to correct such imperfections by watering the must, or by adding sugar, or by adding tannic or tartaric acids, etc. To determine the acidity of musts, several instruments, or acidimeters, have been invented. Most of them require considerable skill and knowledge to be properly used, but the Dujardin acidimetric tube will answer for all practical purposes.

The other substances contained in the must—albuminous matters, etc.—contribute to the formation of extractive matters, after having served to feed the yeast organism.

Vinification.—The French word 'vinification' is a convenient and common term used to cover the details of wine-making. The special treatments of the must result in different kinds of wines.

Thus, we have two distinct classes: (1) 'Dry' wines, and (2) sweet wines.

Dry wines are those in which the sugar has been fermented out.

Sweet wines are those which, after their active fermentation, still retain a quantity of sugar. Many of the sweet wines are fortified by the addition of alcohol.

Wines are often classed as 'still' and 'sparkling.'

Still wines are those in which the carbonic acid gas has wholly escaped. Sparkling wines are those which hold a greater or less amount of carbonic acid gas.

It is useful and convenient to make two classes, namely (*a*) red wines, and (*b*) white wines. Red wines are produced from red or other colored grapes, the color be-

be learned and mastered by reading, or from books. The best we can here do is to describe briefly some of the more important details connected with the manufacture of wines.

Gathering of the Grapes.—The general rule is that grapes should not be gathered till they have reached a state of complete maturity. This condition is shown by certain well-known indications, such as the brownish color of the stem, the softening of the berry, and its easy separation from the stem, the skin is translucent, the juice becomes sweet, thick, and somewhat sticky.

The wine-maker determines the best time for gathering the grapes by using various instruments, known as a must-scale, mustimeter, glucometer, etc. They are employed for the purpose of finding out the saccharine richness or strength of the grape juice, or must. To judge of the sugar content of the grapes a few bunches representing the average condition are first gathered, the juice is expressed and strained through a cloth, collected in a suitable receptacle, and then the must-scale is carefully dropped into it. The quality of the must will be indicated on the stem of the scale. The grapes should be tested from day to day until the density, as shown on the scale, remains stationary, when it is time, as a rule, to gather the crop.

The oldest scale, that of Baumé, was devised to indicate the specific gravity of liquids, or their weight, as compared with that of water. Later scales give the density of the liquid direct, the density of water being indicated by 0. The glucometer invented by Dr. Guyot is very convenient and is used by the French wine-makers. This scale indicates at once, the degree Baumé, the quantity of sugar in the must per hectolitre, and the amount of alcohol that will result from the fermentation of the must per hectolitre. The Salleron mustimeter is another very useful instrument, highly regarded by French wine-makers. The instruments mostly used in this country are Oechsle's must-scale and Balling's saccharometer. All the different must scales are also used during fermentation to determine when the sugar contained in the must has been entirely transformed into alcohol.

Composition of the Must.—A very good idea of the qualities of a good, *average* must may be gained from the following table prepared by Dr. Guyot:

Water	78.
Grape sugar (glucose)	20.
Free acids (tartaric and tannic, etc.)	0.25
Bi-tartrate of potash	1.50
Mineral salts	0.20
Albuminous substances, Essential oils, Mucilaginous and starchy substances	0.05
Total	100.00

It should be pointed out that, of course, these different ingredients are not always in the same proportion; that

merged during the fermentation. The best practice would seem to be in having a submerged head fermentation.

Duration of Fermentation.—This depends on a number of conditions, such as the amount of sugar in the must, the activity of the ferments, the temperature of the vat, etc. It may be completed in two or three days, or it may run on for 15 or 20 days.

Three distinct phases of fermentation will be observed: (1) The first day or two when the ferments are multiplying; (2) the tumultuous fermentation, accompanied by a violent bubbling of the liquid and a rise in temperature, and (3) the active but relatively quiet fermentation.

As a general rule, the more rapid the fermentation the better is the result. In the southern states and in southern California the process may be completed in one, or two days. In the northern or temperate climates the time will run from 7 to 10 days.

The Influence of Temperature.—As we have already indicated, temperature exerts a controlling influence on fermentation. The yeast works best in temperatures ranging from 59° F. to 75° F. Below 59° its action is very feeble and slow; above 75° fermentation becomes retarded and even stops if the temperature passes much above 90°.

Thus, wine-making both in very hot and in very cool climates often presents many difficulties to be overcome. The must frequently becomes what is called 'stuck'—that is, fermentation ceases before all the sugar is transformed into alcohol.

If the trouble comes from too low a temperature, the remedies are: (1) To raise the temperature by heating part of the must; (2) to heat up the fermenting room; (3) to increase the activity of the yeast by adding sediment from vats already through fermentation, and (4) to stir up the pomace so as to bring the germs in contact with the air, as the yeast is always 'greedy for oxygen.'

When the temperature of the must in the vats rises too high, it is necessary to lower the temperature in one way or another. Several methods are employed for cooling the must. Among these we may mention the use of shallow vats, racking off, and refrigerating systems. The difficulties of wine-making in our southern states and in southern California can be overcome only by the adoption of a suitable system for cooling musts.

The success of the wine-maker will always depend on his success in being able to control the progress of fermentation. Therefore, he should be able to control the temperature, which during fermentation has a most important influence (1) on the yield of alcohol, (2) on the qualities of wine, and (3) on the keeping qualities of wines.

Drawing off the Wine.—Active fermentation can be

recognized as being over, by the falling of the temperature, the settling down of the solid mass, or marc, by the clearing of the liquid, and the vinous taste and smell. The new wine will show from 0° to 2° by Balling's saccharometer, nearly all the sugar having been transformed into alcohol. It is either run into a large tub and emptied into casks, or it is pumped into casks. The drawing off of the new wine leaves in the vat the 'marc,' which contains a considerable quantity of wine. The marc when pressed furnishes what is known as 'press-wine'; this represents usually about one-fourth of the product, and the vat-wine three-fourths.

Wine Presses and Press Wines.—It is not necessary to enter into a detailed description of the different forms of wine presses. They are worked by a screw or by hydraulic pressure to be operated either by hand or steam power. Where grapes are handled on a large scale, as in some sections of France and California, continuous presses of recent invention are used. They are composed of two or more cylinders, worked as crushers, and after passing through these cylinders the grapes are carried by a screw, which forces them in a perforated horizontal cylinder, terminating in an orifice through which the marc in a compact cake is expelled. Even the best presses are not perfect as far as the yield or quality of the wine is concerned. Recent experiments show that the marc can be exhausted without presses.

The first run from the press is of course the best. It is often mixed with the vat wine. The second, third and fourth lots are inferior, and seldom mixed with the other wine; the last run is mixed for making vinegar or brandy.

Utilization of the By-Products.—From the husks and lees are obtained the following products: Second wines, 'Piquettes,' and by distillation, brandies and tartar. The second wines are produced by adding water to half the amount of the wine already drawn off, sufficient sugar to give from 6 to 7 per cent. of alcohol, and tartaric and tannin when acidity is needed. The piquettes are sour wines obtained by adding pure water to the marc, before or after pressing; the cask is filled and closed. In course of time a 'wine' having from 3 to 4 per cent. of alcohol is produced, but it will not keep long. This is the cheap but healthful drink so largely consumed by the peasants and working people in France.

Brandies.—They are obtained either by distilling the marc direct, or by the distillation of a piquette wash. The best kind of brandy of the Cognac type is produced by distillation of a sound, clean wine. This process of distillation requires improved stills and special treatment. The 'wash' for brandy spirits is obtained by running water into a tank filled with the marc, or pomace; the overflow is allowed to run into a second tank containing pomace, and the overflow from this tank passes into a

third tank filled with pomace. It is seldom profitable to distil the wash unless it contains from 5 to 7 per cent. alcohol.

Tartar.—This is extract from the lees, or deposited as a crust in the vats. It is obtained by causing a mixture of the marc and water to boil slowly for an hour or so; when the boiling liquid is drawn off and cooled the tartar crystallizes out. From the crude product is manufactured 'cream of tartar,' and tartaric acid.

Manufacture of White Wine.—The making of white wine differs from that of red wine principally in the matter of not having fermentation of the must take place in contact with the skin and solid parts of the grape. Two processes are to be taken into account: (1) The making of white wine from white grapes, and (2) the making of white wine from red or dark-colored grapes. The first-named process is of course the easiest one. Briefly stated, it consists in crushing the grapes, draining them, putting the drained marc in the press, and then leaving the juice from both of the operations to ferment. The main thing is to get the liquid free from impurities, as white wine should be perfectly clear. The usual method is to allow the must to settle and the suspended impurities to be deposited. The liquid must therefore be kept perfectly still for the required time; in other words, it is kept from starting into fermentation. This is accomplished by the process called 'sulphuring.' The effect of applying sulphurous acid to the must is to paralyze the action of the ferments or yeasts.

After the must has become clear, it is separated from the deposit and run into the vat to undergo fermentation. During this process the must should be aerated as much as possible in order to drive off all odor of the sulphurous acid, as well as to encourage the activity of the yeast. The fermentation starts slowly and is always less vigorous than in case of red wines. When the fermentation is over, the white wine should be racked and put in casks which have been lightly sulphured and allowed to remain until perfectly cleared.

The manufacture of white wine from red or dark-colored grapes is attended with much more difficulty and labor than in the process of using white grapes. Without going into details, the main points to be observed are: (1) To avoid breaking the skins of the grapes, and thus start fermentation before crushing; (2) to proceed rapidly with the work of crushing and pressing; (3) to crush the grapes so as not to free the coloring matter in the skins; (4) to suppress all traces of coloring matter in the must, and separate the suspended impurities by the method above described. It is the opinion of expert wine-makers that in order to obtain the best results, white wine should be made from both white and red grapes.

Sweet Wines.—The familiar French term for sweet

wines is *vins de liqueur*. These wines are the result of manipulation; that is to say, sweet wines are not obtained by the plain and simple process of fermentation of fresh grapes, but they have more or less alcohol added, and in some cases sugar is added. The best-known types of sweet wines are: Port, Sherry, Tokay, Madeira, Malaga, etc.

Port Wine.—Wines of this type are produced by fermenting the must down to 6 to 8 deg. of sugar, and then from 4 to 7 per cent. alcohol is added to arrest further fermentation. This will give a wine having a strength of from 14 to 15 deg. alcohol. In the following spring the wine is racked, and from 2 to 3 deg. more of alcohol added. Thus, in the course of a year or so Port wine is gradually brought up, or 'fortified,' to 20 and 22 per cent. alcohol. Contributing to the final result are the methods of 'blending,' whereby color, body, flavor, bouquet, etc., are obtained.

Sherry Wine.—Our word 'Sherry' is derived from the Spanish name Xeres, and this type of wine was originally produced and shipped from the town of Xeres. It is made from several varieties of white grapes grown in the province of Andalusia. The usual Spanish custom is to sprinkle each pressing of grapes with a certain amount (two or three handfuls) of gypsum. This operation, called plastering, is regarded as favoring fermentation. The must is fermented down to about 8 or 10 deg. sugar, and then alcohol is added, bringing the wine up to 16 or 18 deg. alcohol.

One feature of the manufacture of sherry wine in Spain is the system of *Soleras*. The word describes fine old mother wine, and the system consists in blending wines of different ages or years. Thus, the casks of sherry wine are arranged in groups, piled in tiers, and the groups graded according to quality. When wine for blending or shipment is drawn from the group of casks constituting the oldest solera, they are refilled with wine from the casks of the next younger solera, and these again from the next, and so on down to the last group.

Another feature in the production of sherry is baking the wine by natural or artificial heat. The casks containing the wine are ranged in a building with the roof and exposed side covered with glass. The temperature in this sherry house during the day runs as high as 140° F. and is maintained at night by fires. Several of the large producers of sherry in California attain the same end by baking the wine in a specially-built chamber or room, which is heated by steam or hot air.

Champagne and Sparkling Wines.—The word 'Champagne' was originally very properly applied to wines, whether still or sparkling, made in the champagne district of France. It now has a wider and more special meaning. By custom and popular usage champagne is

the name given to a type of sparkling wine produced by a process of fermentation in the bottle. Thus, we have not only French champagne, but German champagne, Italian champagne, American champagne, etc. Sparkling wines are produced in most wine-making districts; some of the best known are, Sparkling Saumur, Sparkling Burgundy, Sparkling Beaujolais, in France; Sparkling Moselle in Germany; Sparkling Catawba, in the United States, etc. There are also 'imitation champagnes.' These are still wines which have been made sparkling by having carbonic acid gas forced into them, somewhat after the same fashion as soda water is produced.

The manufacture and manipulation of champagne requires considerable skill and knowledge. Some of the steps in the process may be described:

After the wine has gone through its first fermentation, it is racked off into casks, and a blend of the juices of different grapes is made. Then the wine is bottled and put in a warm place in order to start a second fermentation. At the proper time the bottles are stored in cool vaults, where the temperature is 50° F. or lower the year round, and where fermentation proceeds very slowly. It is important to keep the vaults at an even temperature, in order to prevent serious loss from breakage which a sudden rise in temperature would cause.

At first the bottles are stacked in horizontal layers, and as the wine begins to mature the bottles are placed in A-shaped racks. The bottles are gradually worked neck downward, in order to bring the sediment, which forms during the slow fermentation, down upon the cork. This is accomplished by the workmen giving each bottle a quick shake once or twice a day during a period of four to six weeks.

When the wine is taken to the finishing room, the sediment down on the cork is 'disgorged'—that is, the workman loosens the cork and the lively pressure of the gas in the bottle forces out the sediment, leaving the body of the wine perfectly clear. Champagne in this state is 'brut'—almost absolutely 'dry.' To please the taste and palate of consumers, the wine is sweetened by adding a little liqueur, or 'dosage' as the French call it, composed of rock candy syrup dissolved in old wine or brandy. The final operations comprise putting in a fine cork in the bottle, wiring and capping it, pasting on the label and casing the bottles in boxes for shipment. It has been figured that a bottle of champagne from start to finish is handled about 200 times.

Handling and Taking Care of Wine.—It is always necessary to keep casks or barrels of wine in a well-ventilated, cool place. When wine is drawn off, and when there is loss from evaporation, the barrel should be filled up.

New wine soon begins to clear itself by the deposit of solid matters held in suspension. The thick deposit which forms at the bottom of the cask is called the lees. In order to prevent the lees from mixing with the liquid, wines are 'racked' or drawn off several times a year. The sudden changes of temperature in the spring and autumn disturb wines, and so it is the practice to rack them at these periods. When racking it is not desirable to let the wine come in contact with the air. In order to obtain perfectly clear wines it is usually necessary to filter or clarify them.

The following method for clearing red wines, such as claret, etc., may be recommended: Take the whites of five fresh eggs for every 50 gallons of wine, beat them up into a form. Then put this form into a gallon of the wine to be fined, and after beating it again pour the mixture into the barrel.

Then take a stick and stir the whole barrel of wine until the foam appears at the bung-hole, which should be in about ten minutes. Leave the bung off over night. The next day fill up the barrel with same kind of wine, and drive in the bung. The wine should be bright in from 10 to 15 days; if not, then fill up, and, at the end of another week it should be.

For clearing white wines, such as Reisling, Hock, Sauterne, etc., take one wineglassful of dissolved isinglass for every 50 gallons of wine. Beat this into a foam with a gallon of the wine to be fined. Pour it back into the cask, and follow the directions above given for red wines. Usually the white wines take a little longer time to clarify than do clarets.

Some Diseases of Wine.—Wines are subject to many diseases. They often become 'sick.' Then they need 'nursing' and doctoring.

Acid Wines.—They are due to the change of alcohol into acetic acid under the action of the air and heat. When wine has become slightly sour, rack it into a cask strongly sulphured, and clear it with six whites of egg to about 250 bottles. Some try to correct acid wine by mixing it with good, sound new wines, or with fresh lees, but the cure is only temporary. Wines so corrected only have their acidity disguised, and must be used soon.

Greasy Wines.—When wines turn greasy they cloud and rope like oil. White wines are more subject to this disease than red. Wines weak in alcohol and tannin are subject to the disease. Therefore, the addition of brandy spirits and tannic acid is recommended. Some also use a half a pound of alum for a cask, which should be stirred thoroughly and rack off several days afterward.

Flat or Cloudy Wines.—This is found in wines poor in alcohol and having an excess of albuminous material. The trouble is cured by transferring the wine to a freshly sulphured cask and adding alcohol. The wine

should be fined, and after a few days from 50 to 60 grains of tartaric acid per 50 gallons should be added.

Bitterness.—This is, or was, one trouble with French Burgundy wines. The disease is not so common in this country. The defect may be corrected at the start by putting the wine in sulphured casks, and adding sufficient alcohol, tannic acid, and tartaric acid.

Classification of Wines.—The following is a list of well-known types of wines, arranged according to the countries where produced:

1. French Wines.—*Claret, Graves, Sauternes, Barsac, Burgundy, Hermitage, Roussillon, Chablis, Frontignac* (Muscat), *Champagne, Saumur,* etc.

2. German Wines.—*Riesling.* The terms *Rhine, Moselle,* and *Pfalz* are usually applied to the growths in those districts. The word *Hock* is also applied to certain Rhine wines.

3. Austrian Wines.—*Vöslauer, Goldeck.* Hungarian Wines.—*Tokay, Ausbruch,* etc.

4. Italian Wines.—*Barolo, Barbera, Nebbiolo, Valtellina, Asti, Chianti, Lacryma Christi, Falerno, Capri, Marsala, Muscat* of Syracuse, etc.

5. Spanish Wines.—*Sherry, Malaga, Val de Penas, Vinos, Tintos* (Spanish Reds).

6. Portuguese Wines.—*Ports, Lisbon, Collares, Carcavellos.*

7. Madeira and Canary Island Wines.—*Madeira, Malvasia, Canary* (sack), *Malmseys.*

8. Grecian and Ionian Wines.—*Hymettus, Noussa, Kephisia, Corinth, Patras, Santorin,* etc.

9. Swiss Wines.—*Neufchâtel, Gringet,* and *Montreux.*

10. Turkish Wines.—*Candian* (Island of Crete), *Cyprus, Mt. Lebanon,* etc.

11. Russian Wines.—*Crimean, Kakhetian* (Caucasus), *Donski* and *Krimski* Champagnes.

12. Australian Wines.—Australian *Burgundy, Hermitage, Sauterne, Port,* etc.

13. Cape of Good Hope Wines.—*Cape Madeira, Constantia.*

14. Persian Wines.—*Shiraz.*

15. Wines of the United States.—(*a*) From native varieties of grapes grown east of the Rocky Mountains: *Scuppernong* (in the Southern States), *Catawba, Delaware, Norton's Virginia* and *Ives, Claret, Concord, Iona, Champagne,* etc. (*b*) European or foreign varieties of grapes are grown in California; therefore we have the following 'types': *Claret, Burgundy, Zinfandel, Riesling, Sauterne, Port, Sherry,* etc.

For convenience we may group some of the leading wines as to color and taste, although it should be remembered that many of them are made in color both red and white; in taste sweet and dry.

RED DRY WINES	Catawba
Claret	Delaware, etc.
Burgundy	RED SWEET WINES
Hermitage	Port
Barolo	Tokay
Valtellina	Constantia
Chianti	Roussillon
Zinfandel	Tarragona (Port)
Norton's Va.	WHITE SWEET WINES
Ives Seedling	Sauternes
Cynthiana, etc.	Sherry
WHITE DRY WINES	Muscatel
Graves	Angelica
Sauternes	Lacryma Christi
Chablis	Marsala
Moutrachet	Malaga
Rhine, or	Catawba
Riesling	Delaware
Moselle	Scuppernong, etc.

Alcoholic Strength, etc., of Wines.—During the past 20 years many analyses of European wines have been made, and the data thus obtained have been used for the purpose of arriving at a standard for judging wines. In this way it is possible to determine the purity and quality of any type of wine. The limits of composition and the ratios which have been adopted in European countries for applying analytical results in judging the purity and quality of wines, together with a number of analyses of American wines, have been compiled by W. D. Bigelow, of U. S. Department of Agriculture. (See Bulletin No. 59 on *The Composition of American Wines*, 1900.) The following chemical analyses of European wines is the most recent made by German analysts:

Name.	Specific gravity.	Alcohol.	Extract substances.	Sugar.	Acidity.	Ash.
Pisport, 1848er	0.998	10.8	2.226	0.520	0.583	0.203
Rudesheim, 1848er	0.996	11.4	2.450	0.425	0.519	0.179
Johannisberg, 1842er	0.992	10.0	2.059	0.416	0.514	0.120
Assmannshausen, 1857er	0.993	10.4	2.675	.....	0.427	0.212
Oberingelheim, 1866er	0.999	10.22	3.876	.....	0.510	0.247
Walportsheimer Berg, 1865er	0.993	11.12	3.025	0.077	0.514	0.200
Forster Auslese, 1848er	0.996	11.4	2.464	0.630	0.484	0.133
Leistenwein, 1871er	0.993	11.02	.....	0.011	0.660	0.171
Voslauer Goldeck, Kabinett	0.993	10.281	2.534	.....	0.592	0.258
Pauillac-Beycheville, 1865er	0.995	9.055	2.534	.....	0.637	0.198
St. Julien, 1865er	0.995	9.281	2.546	.....	0.637	0.228
Malaga	1.069	13.20	14.40	9.90	.....	.....
Madiera	0.994	18.00	5.51	.....	0.37	0.428
Sherry	0.991	20.70	3.71	1.66	0.464	0.479
Port	0.996	20.10	4.30	2.79	0.439	0.278
Tokay	1.007	16.67	8.13	11.36	0.481	.....
Champagne	.....	13.60	11.1	.....	.....	.....

The standards which have been adopted for European wines are met in all particulars by the best American wines. This is shown by the chemical analyses of American wines receiving awards at the Paris Exposition of 1900. (See Bulletin No. 72, Bureau of Chemistry, U. S. Department of Agriculture, 1903.) According to this report, 'the percentage of alcohol in the samples of dry wines conforms to the standards that have been adopted for European wines. The ratio of alcohol to extract and the sum of the alcohol expressed in grams per litre and the total acridity expressed as grams per 100 cc. conform to the ratios adopted in France for wines to which neither alcohol nor water has been added.' It is also stated that the percentage of acids in the samples examined conforms to the standards of the wine-producing countries. These and other facts go to prove (what is not generally known or held) that our American wines challenge favorable comparison with European wines. In all respects—in purity, cleanness, color, taste, boquet, etc.—the average American wines are better than the average European wines.

TABLE I. SPARKLING WINES.

	Specific gravity at 15.5° C.	Alcohol by volume.	Extract.	Ash.	Total acids.	Reducing sugars.
		Per cent	Gr. per 100cc.	Gr. per 100cc.	Gr. per 100cc.	Gr. per 100cc.
State Seal, Special Dry	1.0040	13.40	5.00	0.144	0.658	3,869
Le Grand Monarque Brut	1.0030	12.30	4.65	.157	.783	3.050
Great Western	1.0042	13.79	5.63	.128	.693	3.586
Grand Imperial Brut	1.0121	11.65	6.94	.137	.681	5.584
Grand Imperial Sec	1.0169	12.05	8.56	.114	.648	5.228
Hommel's Extra Dry	.9990	15.20	4.68	.115	.639	2.851
White Star	.9990	13.95	4.33	.121	.601	2.390
Extra Dry	.9910	13.05	1.78	.171	.622	.023
Sparkling Moscato	1.0113	13.60	7.02	.290	.603	4.100

TABLE II. DRY WHITE WINES.

		Per cent	Gr. per 100cc.	Gr. per 100cc.	Gr. per 100cc.	Gr. per 100cc.
Riesling	0.9925	13.30	2.31	0.241	0.665	0.229
Johannisberger	.9918	11.70	1.96	.226	.558	.051
Haut Sauterne, Pride of Livermore	.9909	12.75	1.78	.230	.613	.328
Riesling	.9920	13.90	2.51	.270	.715	.076
Grey Riesling	.9914	13.35	2.20	.198	.658	.067
Sauterne	.9917	13.75	2.38	.180	.607	.142
Golden Dry Sauterne	.9928	12.50	2.09	.226	.698	.058
Santerne	.9913	11.95	1.78	.160	.535	.064
Blanco	.9914	11.50	1.72	.160	.489	.139
Blanco	.9912	11.50	1.55	.160	.501	.079
Amarillo	.9923	10.90	1.64	.190	.565	.071
Semillon	.9901	14.25	2.11	.172	.498	.116
White Semillon	.9939	10.60	1.85	.222	.672	.142
Chablis	.9916	12.40	1.97	.107	.433	.319
Florida Hock (Old Vintage)	1.0074	12.40	5.71	0.240	0.522	3.713

TABLE III. DRY RED WINES.

	Specific gravity at 15.5° C.	Alcohol by volume.	Extract.	Ash.	Total acids.	Reducing sugars.
		Per cent	Gr. per 100cc.	Gr. per 100cc.	Gr. per 100cc.	Gr. per 100cc.
Ruby Claret	.9939	12.55	2.24	0.204	.682	.153
Norton's Claret	.9931	11.87	2.47	.200	.753	.129
Norton's Virginia Seedling	.9930	15.40	2.80	.338	.823	.200
Virginia Claret	.9958	13.05	2.89	.275	.829	.192
Norton's Virginia	.9969	13.40	3.22	.393	.901	.280
Chateau San Luis Claret	.9955	10.95	2.39	.173	.541	.093
Claret	.9938	12.40	2.50	.273	.592	.074
Claret	.9945	12.50	2.61	.138	.670	.144
Cabernet Pride of Livermore	.9954	12.95	2.99	.324	.648	.106
Cabernet Sauvignon and Carignan	.9937	13.50	2.85	.275	.582	.109
Colorado	.9937	10.10	1.77	.207	.454	.081
Colorado	.9941	10.85	2.11	.239	.518	.056
Grand Wine	.9943	12.80	2.49	.253	.676	.066
Beclan	.9940	12.50	2.56	.250	.639	.100
Chateau Ricardo	.9948	13.50	3.13	.286	.590	.214
Barolo	.9947	11.95	2.56	.233	.649	.204
Tipo Chianti	.9947	13.15	2.63	.233	.654	.145
Zinfandel	.9929	11.85	2.02	.222	.646	.045
Zinfandel	.9935	14.25	2.67	.232	.652	.077
Mataro and Zinfandel	.9926	13.36	2.57	.286	.519	.107
Burgundy	.9947	12.30	2.55	.172	.576	.093
Asti Burgundy	.9941	12.20	2.53	.240	.670	.097

TABLE IV. SWEET WHITE WINES.

		Per cent	Gr. per 100cc.	Gr. per 100cc.	Gr. per 100cc.	Gr. per 100cc.
Catawba	1.0320	16.30	13.85	.117	.534	12.120
Old Angelica	1.0494	19.15	19.35	.198	.286	16.910
Choice Old Angelica	1.0457	21.55	19.01	.225	.160	16.710
Old Sherry	1.0002	21.55	6.80	.178	.421	4.212
Sherry	.9908	20.10	2.83	.263	.376	1.767
Muscatel	1.0408	18.35	16.83	.214	.487	14.520
Old Muscat	1.0418	21.55	17.88	.235	.366	15.110
Choice Old Muscat	1.0477	21.20	19.45	.259	.201	16.760
Escapernong	1.0423	11.60	15.32	.097	.805	11.170

TABLE V. SWEET RED WINES.

		Per cent	Gr. per 100cc.	Gr. per 100cc.	Gr. per 100cc.	Gr. per 100cc.
Good Samaritan Port.	1.0330	20.25	15.23	0.318	0.444	12.270
Pride of Virginia Port	1.0398	17.45	16.30	.234	.546	13.510
Vineyard Queen Old Port	1.0522	17.75	19.71	.241	.444	16.960
Old Malvoisie Port	1.0225	21.15	12.61	.305	.487	8.900
Trousseau Port	1.0268	22.05	14.01	.374	.489	10 070
Old Port	1.0243	20.95	13.04	.347	.397	9.910
Port	1.0241	19.15	12.50	.329	.426	9 820
Mataro	1.0107	13.70	7.57	.283	.826	3.240
Port	1.0153	21.25	10.69	.366	.465	7.662

The latest published analyses of the composition of American wines issued by the United States Department of Agriculture, Bureau of Chemistry, but which were

made by the manufacturers of the various wines, are given below. (See Bulletin No. 72, pp. 19-21, 1903.)

The unrecorded remaining constituents (Tables I to V) consist of glycerol, protein, tannin, potassium, sulphate, various acids and undetermined extract in various almost infinitesimal proportions are not recorded here owing to space limitations.

Wine Production of the World.—The following statistics give the average annual yield of the more important wine-producing countries:

Countries.	Gallons.
France (inc. Algeria and Tunis)	1,710,900,000
Italy	856,520,000
Spain	428,000,000
Austria-Hungary	192,800,000
Portugal	103,320,000
Germany	79,600,000
Russia	76,620,000
Chile	74,200,000
Roumania	52,840,000
Argentine Republic	34,350,000
Turkey	34,350,000
United States	34,000,000
Bulgaria	29,100,000
Switzerland	22,190,000
Australasia	7,925,000
Servia	6,605,000
Oceanica	6,605,000
Brazil	5,600,000
Cape Colony	4,490,000
Azores, Canary and Madeira Islands	3,830,000
Uruguay	2,780,000
Peru	2,400,000
Bolivia	610,000
Total	3,775,060,000

United States.—In 1900 there were 359 establishments in the United States engaged in the manufacture of wine; these were capitalized at $9,838,015; paid $446,055 to 1,163 wage earners; used materials valued at $3,689,330; and the value of the products was $6,547,310. Of these 187 were in California and the value of the products was $3,937,871; 7 in Missouri, value of the products $199,130; 11 in New Jersey, value of the products $241,777; 38 in New York, value of the products $942,548; 52 in Ohio, value of the products $801,684.

The first wine produced in this country was made by the Spanish settlers, in Florida, 1565, from the wild grapes which they found growing there in abundance; and the wild grape seems to have been long used for this purpose. It is recorded that in 1796 the French settlers of Illinois produced 110 hogsheads of wild-grape wine. The first vineyard was planted in Virginia 1620 by the London Company, who some years later imported French wine-dressers; but the venture was not a success. In 1683 William Penn attempted wine-growing in Philadelphia, but it failed. The first California wine was produced 1769 by the Franciscan fathers from the grapes, hence called 'mission' grapes, brought by them from Mexico. Other varieties have since been introduced, chiefly by the enterprise of a Hungarian, Col. Haraszthy,

who spent two years in visiting the wine-growing countries of Europe, and brought back more than half a million cuttings and grape-roots (more than 400 varieties), which he had selected in France, Spain, Italy, and Hungary. Since that time grape-culture especially for wine-making has rapidly extended.—The wines produced in the United States are divided into two classes: (1) Wines made east of the Rocky Mts.; (2) wines of California and the Pacific Coast states.

This division is due to the fact that there are two entirely different stocks, or kinds, of grapes grown in the United States.

East of the Rocky Mts., only American or native varieties of grapes are grown.

In California and on the Pacific Coast, practically only European or foreign varieties of grapes are grown.

Therefore, our eastern wines are of a different 'type' from California wines, which for the most part resemble and have the well-known characteristics of their European prototypes.

The leading grape and wine-growing states east of the Rocky Mts. are: North Carolina, Virginia, New Jersey, New York, Ohio, Michigan, and Missouri. The bulk of the grapes grown in these states are still used for eating or table purposes.

Considerable progress in eastern wine-making has been made in producing a fine quality of champagne by the French process of fermentation in the bottle. A number of brands of American champagne, in color, taste, sparkle, and purity, compare very favorably with the best imported kinds. The headquarters of the champagne industry in the United States is in the Lake Keuka region of western New York, which produces about 75 per cent. of the output. Considerable champagne is also produced in northern Ohio, and thus far only a small amount in California. The total production of American champagne is now estimated at more than 100,000 cases, or 1,200,000 bottles per year.

In conclusion, the manufacture of wine and champagne is an infant industry in the United States. But we have in the eastern states and in California, all the opportunities and all the conditions for success. We have here the right climates, the proper soils, the best varieties of grapes, sufficient capital, and the most intelligent labor and supervision in the world. Therefore, with all these things, and with the growing demand and liking for wines, the wine industry should have a great and prosperous future.

There are three distinct wine-growing regions in Cal.: (1) the Coast Range dist., which includes Sonoma, Lake, Napa, Alameda, Santa Cruz, and Santa Clara counties; and excels in its white and red acid wines, such as Hock, Claret, Sauterne, Burgundy, etc. (2) The Sierra Nevada,

Forthill, and Sacramento Valley dist., which includes Placer, El Dorado, Tuolumne, Yuba, Yolo, Sacramento, and Tehama counties; and produces excellent dry wines of 'exquisite bouquet,' many of which bear great resemblance to the wines of Hungary, Greece, and Cape Constantia. (3) The Southern dist., which comprises San Bernardino, Los Angeles, San Diego, and Fresno counties, and excels in its Port, Sherry, Madeira, Angelica, and other sweet wines. It was in this dist. (in San Diego) that the first California wine was made. Next to California in wine-production are New York, Ohio, New Jersey and Missouri. The Ohio vineyards are chiefly along the shore of Lake Erie, and on the bank of the Ohio river.

The United Kingdom.—Among the leading food imports is wine of which 13,946,191 gallons for home consumption were imported in 1903; 11,992,742 gallons in 1904 and 11,945,599 gallons in 1905. The value of this article of import (1903) was £4,697,598; (1904) £3,822,-206; (1905) £4,074,398.

Cape of Good Hope.—In 1904 there were 77,893,187 vine-stocks, yielding 4,534,069 gallons of red wine, and 4,225,950 gallons of white wine. The value of the exports of wine (1904) was £9,821.

Canada.—The vineyard area in the province of Ontario in 1904 was 14,357 acres.

Australia and New Zealand.—The number of acres devoted to vines is as follows: New South Wales 8,940; Victoria 28,513; Queensland 2,069; South Australia 22,-617; Western Australia 3,324; New Zealand 749. The consumption of wine in Australia has been estimated as follows: New South Wales 952,884 gallons; Victoria 1,503,019 gallons; Queensland 198,817 gallons; South Australia 817,382 gallons; Western Australia 166,450 gallons; Tasmania 31,470 gallons; New Zealand 122,490 gallons. In New South Wales the total wine product (1905) was 928,160 gallons. In Victoria the yield of wine was (1903-4) 2,551,150 gallons; (1904-5) 1,832,-386 gallons. In Queensland the yield of wine was (1904) 60,443 gallons. In South Australia the yield was (1904) 2,625,430 gallons. In Western Australia the yield was (1905) 187,490 gallons.

Argentine Republic.—The area of land under vines in 1894 was 33,459 hectares; (1905) 51,625 hectares. The area under vines (chiefly Mendoza and San Juan) 51,-625 hectares (1904-5). According to the census report of 1895 under the industrial establishments, there are 852 wine-factories.

Austria.—The area of lands under vineyards (1904) was 249,000 hectares; the product 4,484,000 hectolitres or 18.0 hectolitres per hectre.

Hungary.—The area of land under vineyards in Hungary in 1895 was 331,751 hectares, or 1.03 per cent. of

total area. In 1903 the area of vineyards was 278,000 hectares; producing 2,949,000 hectolitres, 10.60 hectares; in 1904 the area was 289,000 hectares, producing 4,257,-000 hectolitres, 14.73 hectares.

Brazil.—The value of the chief imports and exports of wine during 1903 was £1,453,357; in 1904, £1,579,392.

France.—The area of land under cultivation as vineyards in 1900 was 1,609,353 hectares; (1901) 1,618,398 hectares; (1902) 1,587,700 hectares; (1903) 1,588,274 hectares. The yield was (1900) 68,514,906 hectolitres; (1901) 60,074,110 hectolitres; (1902) 42,257,336 hectolitres; (1903) 35,240,257 hectolitres. The production of wine and cider was as follows: Hectares under vines (1904) 1,641,142; (1905) 1,669,257. Production (1904) 66,017,000 hectolitres; (1905) 56,666,000. Wine import (1904) 6,691,000 hectolitres; (1905, 10 months) 4,157,-000. Wine export (1904) 1,645,000; (1905, 10 months) 1,995,667. The value in francs of the exports of wine for the same period was (1900) 227,900,000; (1901) 228,000,000; (1902) 232,500,000; (1903) 224,200,000; (1904) 210,100,000. Imports (1900) 155,300,000; (1901) 84,800,000; (1902) 110,700,000; (1903) 181,500,000; (1904) 160,200,000.

In *Algeria* there are 24,842 vine-planters, of whom about 17,480 are European. The yield of wine in 1904 amounted to 7,630,157 hectolitres. In Tunis, the vineyard area in 1902 was 12,700 hectares.

German Empire.—The area of the vines in 1904 was 119,873 hectares. The wine yield (1904-5) was 7,244,408 hectolitres per 35.40 hectre. The vintage of 1906 was poor. The caterpillars attacked the vines and did much damage. The season promised at its opening to be an unusually good one. A big yield was regarded as a certainty, when of a sudden it was reported that downy mildew had attacked the vines in several districts of the wine country.

The mildew was succeeded by a plague of caterpillars, the hay worm or sour worm, as they are popularly called. Thousands of these were discovered, but not all could be removed from the plants and great damage was caused by them.

Greece.—The yield of wine in the Ionian Islands in 1904-5 amounted to 4,500,000 gallons. The value of the wine exported in 1904 was $2,282,198.

Italy.—Wine area in 1903 was 4,010,000 hectares; the produce was 35,100,000 hectolitres. In 1905 the wine production amounted to 32,445,000 hectolitres. The value of the wine exports in 1904 was £39,644,920.

Portugal.—The value of the wine exported in 1904 was $9,431,000. The export consisted of common wine to the value of $3,912,000; liqueur wine, $137,000; Madeira, $752,000; port, $4,630,000. More than a half of it is sent to Brazil, considerable quantities being exported

also to England and to the Portuguese colonies. The value of the imports from Portugal into Great Britain in 1904 was £857,822.

Wine is manufactured also in *Bulgaria, Crete* (exported to Malta), *Samos,* the yield for the last named place being 1,892,000 gallons in 1904.

Adulteration of Wines.—On this subject Frank Vizetelly, writing in *The Encyclopedia of the Alcohol Problem,* says: 'Adulteration is the act of debasing or corrupting as by admixture with noxious ingredients especially for purposes of fraud.'

The practice of adulterating wines dates from remote antiquity. The Scriptures denounce the use of mixed wines, referring no doubt to spiced wines or such as were strengthened by the injection of stimulating herbs. Numerous references to the adulteration of wines in the process of their manufacture are found in the classics. Columella, the most erudite of Roman writers on agriculture, is authority for the practice of mixing with a specific quantity of must ten sextarii of liquid Nemeturican pitch which had been boiled in sea-water, then the adding of one pound and a half of turpentine resin. The liquid, being allowed to reduce its bulk two-thirds by evaporation, was then subjected to the effects of six pounds of crude pitch in powder which were mixed with it by degrees, together with such aromatic herbs as spikenard, myrrh, saffron, cardamonis, cassia, etc. These ingredients were supposed to help in the fining of the wine much in the same manner and for the same purpose as sulphur is used today.

That the use of sulphur was known also to the ancients is proved by Pliny (*De Re Rustica,* c. 113), who specifies it as one of the substances used by Cato to fine his wines, but there are no data showing whether it was applied as a solid or in the form of vapor.

Probably the Romans introduced the practice into England, if not these it may be ascribed to the Normans, for, at a very early period, measures were taken to prevent the sale of adulterated wines in that country. As early as the reign of Edward III. (1327-1377) persons were appointed to inspect the condition of all wines sold and the Vintner's Company, incorporated in this reign as the 'Wine Tonners' controlled both the price and the purity of the wine sold. Under the Vintner's Company's direction all imported wines were assayed twice a year and those that had soured, were spoiled, or had been tampered with were condemned as harmful to public health and destroyed. All vessels that contained such wines were broken. Destruction of the goods was not the only penalty for the offender, whether guilty of adulteration or of merely having adulterated wine on his premises, he was sent to the pillory.

Notwithstanding legislation to abolish adulteration it

continued, for in the tenth year of the reign of Henry VI. (1432) a petition was presented praying relief from the practice. Stowe declares that in the sixth year of the reign of Henry VI. the Lombards 'corrupted their sweet wines and when the fact came to the knowledge of John Ranwell, Mayor of London, he ordered that the heads of all the butts be broken and that the contents be poured into the open streets.'

Further legislation was invoked in the reign of Mary I. (1553-1558) for in the sixth parliament of her reign horror was expressed at the adulteration of the genuine juice of the grape in the following terms:

'And besyde the samin, sic wynis as are sould in common tavernis ar commonlie be all tavernaris mixt with auld corrupt wynis and with water, to the greit appeir- and danger and seikness of the byaris, and greit perrill of the saulis of the sellaris.'

Remedial legislation was passed but the evil continued and under Charles II. (1660-1685), when almost every form of corruption that brought revenue was licensed, it was enacted by Parliament that 'No merchant, vintner, wine-cooper, or other person, selling or retailing wine, shall mingle or either any Spanish wine mingled with any French wine, or Rhenish wine, cyder, perry, stummed wine, honey, sugar, syrup of sugar, molasses, or any other syrups whatsoever; nor put in any isinglass, brimstone, lime, raisins, juice of raisins, water, nor any other liquor nor ingredients, nor any clary, or other herbs, nor any sort of flesh whatsoever.' (12th Car. II. C. 25. §11.)

The penalties for the infringement of this law were, for merchants and wine-coopers, confiscation of the goods and a fine of one hundred pounds for each offense; for vintners, confiscation and a fine of forty pounds.

Similar laws were enacted in other parts of the world which in a measure checked rather than stopped the manufacture of spurious wines or the adulteration of the genuine product of the grape. Thus in the early German Empire the Imperial Diets decreed the prohibition of the use of lime, gypsum (a substance much used today in the manufacture of sherry), sulphur, and milk, but failed to proscribe adulteration with lead.

At one time quantities of litharge were added to ascescent wines but when or where is not exactly known. That the practice was followed in France in 1696 has been shown by the finding of an ordinance prohibiting it. (Henderson, *History of Ancient and Modern Wines*, p. 339).

The adulteration of wines in modern times may be said to have been reduced to a science. It consists chiefly of blending wines from different countries or of different vintages, and of manipulation with substances foreign to the grape.

The stronger wines before exportation are fortified with a certain quantity of spirits; certain qualities are said to be colored artificially by the use of various coloring matters and probably port wine has been subjected to these more than any other variety.

To Lord Lytton, one time Secretary of the British legation at Lisbon, has been ascribed the report that 'all port wine intended for the English market was composed almost quite as much of elderberries as grapes.' The Agricultural Council of the Pyrénés Orientales drew the attention of the French Minister of Commerce to the fact that wines imported from Spain were artificially colored with extract of elderberries. Vizetelly, writing on the subject in his *Facts about Port and Madeira* (p. 142), says the color and fruitiness of certain port wines are due to the addition of geropiga composed of one-third spirit and two-thirds unfermented grape juice, and to the steeping of the skins of dried elderberries in it.

At one time it was popularly claimed that logwood was used to dye port wine to the desired color, and no less an authority than Henderson (*History of Ancient and Modern Wines*, p. 341) supports the claim. He says: 'As a high color is generally—considered a criterion of the excellence of particular wines—it is frequently supplied by artificial means. For this purpose a variety of coloring matters are (sic) employed, such as the elderberry, whortleberry, privet, beetroot, tournesol (*Croton tinctorium*), logwood, Brazil-wood, etc.; all of which, though they may improve the tint, deteriorate the wine. It is well known that port wines used to be prepared in this manner.' Subsequent investigation proved that it was impossible to dye wine of any kind with logwood for the color of logwood is purple only in alkaline solution.

Though it is conceded by vintners and writers on manufacture of wines that dried elderberry-skins are used to impart color to ports, the latter declare that the elder-tree has been extirpated from the Alto Douro district whence Port wines come, but that the poke-weed (*Phytolacca decandra*) remains and that vintners have found that the fruit of this plant answers for the same purpose. (See HENDERSON, *ib.*, p. 342.)

The practise of adulterating port wine with spirits, commonly styled 'fortifying,' whenever it is racked or before it is shipped abroad, dates from the first quarter of the eighteenth century; for although the Portuguese were ignorant of the methods adopted in preparing the wine for export in 1715, yet five years later a small work entitled *Agricultura das Vinhas* was published in which it is asserted that the addition of half a *canada* of brandy to every pipe of wine will greatly improve it (p. 146).

That there are legitimate methods for the bettering of wines which are adopted by wine-makers is widely

known. These include the addition of such constituents of the grape as may be found deficient in any particular vintage. They are used during the period of fermentation or while the wine is in the course of formation.

Port wine can be made artificially by mixing Beni Carlos, Cape, Figueros and Mountain, the latter of which imparts both richness and softness. Gum-dragon, more commonly known as gum-tragacanth (*Astragalus verus*), produces the flavor; berry-dye, a substance obtained from bilberries, imparts the color. To these are added the rinsings of brandy casks and a small quantity of tartrate to form a crust. The inferior grades of brown sherries and the cheaper varieties were formerly doctored with Cape wine and cheap brandy, being flavored with bitter almonds, sugar-candy and rinsings of brandy casks. Gum-benzoin is used to bring the mixture to the desired softness, and blood is used to reduce the color.

Madeira and Champagnes have also been imitated, the artificial product being made, insofar as Madeira is concerned, by mixing various wines and adding bitter almonds and sugar, while the so-called champagnes are the product of gooseberries, rhubarb and sugar.

Among the various ingredients with which wines are doctored the following, taken from books intended as guides to the manipulation of the different types, may be mentioned: *For color:* Brazil-wood, cudbear, beet-root, elderberry, bilberry, logwood, Saunders-wood, etc. *For astringency:* Catechu, logwood, oak-bark and the leaves of the sloe. *To correct acidity:* Carbonate of lime, carbonate of soda, carbonate of potash, lime, litharge. *To remove color:* Gypsum, sulphate of lime, Spanish earth or alum. *To impart bouquet or flavor:* Ether, particularly acetic ether.

No satisfactory test of the purity of wine can be made without having recourse to complicated chemical processes.

According to the *New York Times* (1904, Jan. 17), Prof. Robert M. Allen, Secretary of the National Pure Food Association, has made public report 'that 60 per cent. of the French wines and 80 per cent. of their champagnes are either adulterations or imitations. . . . The wines and champagnes are adulterated with new alcohol, coloring matter, and acids deleterious to health.'

Dietetic and Medical Use of Wine.—The dietetic and medical value of wine has been a subject of much debate. There has been a great change from the theory of former times which held wine or its equivalent to be a necessity of ordinary life and a universal remedy in disease. An extensive school opposes its use not only in health but in every form of illness. See ALCOHOL: TEMPERANCE: TOTAL ABSTINENCE. On this subject the U. S. Dispensatory says:

'Wine is consumed in most civilized countries; but in

a state of health it is at least useless, if not absolutely pernicious. The degree of mischief which it produces depends upon the character of the wine. Thus the light wines of France are comparatively harmless; while the habitual use of the stronger wines, such as sherry, port, madeira, etc., even though taken in moderation, is always injurious, as having a tendency to induce gout, apoplexy, and other diseases dependent on plethora and over-stimulation. All wines, however, when used habitually in excess, are productive of bad consequences. They weaken the stomach, produce disease of the liver, and give rise to gout, dropsy, apoplexy, tremors, and not unfrequently mania. Nevertheless wine is an important medicine, productive of the best effects in certain diseases. In the convalescence from protracted fever it is frequently the best remedy that can be employed. . . . When given in low febrile affections, if it increase the fulness and lessen the frequency of the pulse, mitigate delirium, and produce a tendency to sleep, its further use may be deemed proper; but if it render the pulse quicker, augment the heat and thirst, produce restlessness, or increase delirium, it should be laid aside as injurious.'

It has been claimed that wine is much less frequently prescribed than formerly by the most skilful physicians.

Wine is used to a certain extent as a pharmaceutical menstruum for holding various substances in solution, forming medicated wines, as *wine of aloes, wine of antimony,* etc. Of these preparations the U. S. Dispensatory says: 'But most wines, particularly the light varieties, are liable to undergo decomposition, and even the strongest acquire such a liability from the principles which they extract from vegetable substances; so that medicated wines, though they keep much better than infusions or decoctions, are inferior in this respect to the tinctures. The proportion of alcohol, however, is not constant; and the preparations, therefore, made with them were formerly of unequal strength. From these causes, few medicated wines are at present retained.'

Bibliography.—The best books on wines and wine-making are in French or German. The following standard French works may be noted: Ladrey, *L'Art de faire le Vin* (1882); Maumené, *Traité theorique et pratique du travail des Vins* (1890); Coste-Floret, *Procédés modernes de Vinification* (1895); Salleron et Mathieu, *Etudes sur le Vin Mousseux* (1895); Sebastian, *Les Vins de Luxe* (1897).

There are but few books in English of recent date on wine-making. We note the following: Thudichum & Dupré, *Origin, Nature, and Varieties of Wine* (1872); Rixford, *The Wine Press and the Cellar* (1883); Husmann, *Grape Growing and Wine Making* (1897); Henderson, *History of Ancient and Modern Wines;* Vizetelly,

The Wines of the World; ibid., *Facts about Port;* ibid., *Facts about Sherry;* Williams, *Chemistry of Cookery.*

WINE-BERRY: a Japanese plant (*Rubus phœnicolasius*), with long recurving canes which root at the tips and are clothed with red glandular hairs. The leaflets are usually three, white, tomentose beneath, and the flowers are in dense axillary clusters, forming a loose panicle. The bristly calyx-lobes enlarge in fruit, and enclose the immature berry as in a bur, but eventually spread apart; the mature fruit is small, soft, cherry-red in color, in flavor insipid or acid. The wine-berry is said to prolong the season of *Rubus* fruits, as it ripens in September, and to be good for preserves. The plant is also interesting, especially in spring, for the shrubberies. The grape, the whortleberry, the gooseberry, and the red and the black currants are called wine-berry; as are also the edible, berry-like fruits of the poisonous toot-plant (*Coriaria sarmentosa*), a large shrub of New Zealand.

WINE MEASURE: an old English measure by which wines and spirits were sold. The gallon contained 231 cubic inches.

WINE PRESS: a machine in which the juice is pressed out of grapes. The wine press of the Bible was a vat, in which the juice was expressed by the feet of men who trampled the fruit.

WINEBRENNER, John: founder of the denomination known as the 'Church of God': b. Frederick co., Md., 1797, Mar. 24; d. 1860, Sept. 12. He was ordained a minister of the German Reformed Church in 1820, and was called in the same year to the Salem Church, Harrisburg, Pa. He retained that charge until 1827, when his outspoken attitude against slavery and the traffic in intoxicating drinks led to his being asked to withdraw, and in 1828 he ceased to be connected with the Reformed Church. In 1830, Oct., he established the denomination called the 'Church of God,' whose members also became known as Winebrennerians. He edited for some time the *Gospel Publisher,* afterward the *Church Advocate,* and issued several works, including *A Treatise on Regeneration; Practical and Doctrinal Sermons;* the *Church Hymn Book;* etc.

WINEBRENNERIANS, *wīn-brĕ-nē′rĭ-anz,* or Church of God: denomination of Baptists, calling itself the Church of God, but known by the first appellation from its founder, John Winebrenner. Settled as pastor 1820 of a German Reformed church in Harrisburg, and at the same time ministering to three other churches in the vicinity, a religious revival among his people excited opposition to him from both lay and clerical brethren; and this led to a separation about 1825. The good work continued and spread, resulting in the formation of churches

on an independent and congregational basis. The first organization under the name Church of God was in 1829; and in 1830 a conference of ministers was held, with Winebrenner as president. In a sermon he gave his views of primitive polity—namely, that churches should be for believers only, without sectarian or human name, with no creed and discipline but the Bible, subject to no ecclesiastical jurisdiction, and governed under Christ by officers of their own, elected by a majority of the church. The conference became annual under the name Annual Eldership, with a triennial meeting termed General Eldership, which attends to the general government and benevolences of the denomination. The ministers are called elders, and are either resident or itinerating. The faith, held without creed, is distinctly evangelical, special importance being given to the two Christian ordinances of Baptism and the Supper, to faith and immersion as essential to baptism, also to a ceremony of feet-washing as obligatory. The Lord's Supper is administered in the evening. The denomination claims to be more primitive in its order than any existing body, though it regards the Free Baptists as nearly akin. It has a publishing-house at Harrisburg; a weekly paper, *The Christian Advocate;* an academy at Basheyville, Penn., and a college at Findlay, O., opened 1886. The denomination had, 1908, in the United States 590 organizations; 499 ministers; 17,500 members; church property valued at $643,185. The Winebrennerians are represented in 14 states and in the Indian territory. Their chief strength, however, is in Pennsylvania, Ohio, and Indiana. Missionary labors are sustained in Kansas, Missouri, and other states.

WINES, *wīnz,* Enoch Cobb, d.d., ll.d.: prison-reformer: 1806, Feb. 17—1879, Dec. 10; b. Hanover, N. J. He graduated at Middlebury College 1827; was midshipmen's teacher in the navy 1829; teacher at Washington, D. C.; Princeton and Burlington, N. J., and in Philadelphia; Congregational pastor in Cornwall, Vt., and in East Hampton, N. Y.; professor of ancient languages in Washington College, Penn., 1853, and president of the St. Louis City University 1859. From 1862, when he became secretary of the New York Prison Association, until his death in Cambridge, Mass., he was devoted to the object of the society, accomplishing more for it, probably, than any other individual in this century. With Dr. Theodore W. Dwight he visited the penal institutions of the United States, and reported to the New York legislature 1867. He originated the National Prison Association; was appointed United States commissioner to organize the International Penitentiary Congress at London; and attended similar congresses. He published a large number of works on various subjects; and on *State*

of Prisons and Child-saving Institutions (1880) was a posthumous publication.

WINFIELD, *wĭn'fēld:* city, capital of Cowley co., Kan.; on the Walnut river, and on the Atchison, Topeka & Santa Fé, the Missouri Pacific, and the St. Louis & San Francisco railroads; 12 m. n. of Arkansas City, 42 m. s.s.e. of Wichita. It has a costly county court-house, jail, graded school, 6 churches, several banks, flour-mills; daily and weekly papers and monthly periodical. It is the centre of a rich agricultural region, with which it has large trade. Pop. (1900) 5,554; (1910) 6,700.

WING, n. *wĭng* [Icel. *vængr;* Sw. *winge,* a wing: comp. W. *gwingo,* to kick, to spring: Icel. *vingsa,* to swing]: that limb of a bird by which it flies, and under which it protects its young; *figuratively,* care or protection, particularly in the *plu.;* passage by the wing, means of flying; anything compared to a wing in form or position; a side erection attached to the main edifice; in *bot.,* a membranous border by which many seeds are supported in the air and transported from place to place; the extreme right or left division of an army; the ships on each extremity of a fleet arranged in line of battle; in a *theatre,* one of the sides of the stage; also, a scene to fill up the side of the stage; in *OE.,* motive of flight: V. to furnish with wings; to enable to fly or move with speed; to supply with side parts; to transport by flight; among *sportsmen,* to wound in the wing, as a bird; hence, to wound in a limb, as a human being. WING'ING, imp. WINGED, pp. *wĭnged:* ADJ. having wings; swift; rapid; soaring. WING'LESS, a. *-lĕs,* having no wings; not able to fly. WING'LET, n. *-lĕt,* a little wing. WING'Y, a. *ĕ,* having wings; soaring. WING'CASE, or WING'SHELL, the hard outer case of the wings of many insects, as the beetles. WING'FOOTED, nimble; swift; fleet. WINGED-LION, n. the symbol of the evangelist St. Mark, adopted as the heraldic device of the Venetian republic when St. Mark supplanted St. Theodore as the patron saint of Venice. A celebrated bronze figure of the winged-lion of St. Mark, surmounting a magnificent red granite column formed out of a single block, stands in the Piazzetta of St. Mark at Venice. ON THE WING, flying; speeding to an object; going from one place to another. WING VALVE, a lift or poppet valve, the lift of which is guided by three or four feathers, wings or ribs, cast on the under side of the valve and fitting into its cylindrical seat. It may be placed vertically as in the case of an ordinary safety valve, or horizontally or otherwise, if it is pressed against its seating by means of springs.

WIN'GATE, GEORGE WOOD: American lawyer: b. New York 1840, July 1. He was educated in the public schools, and served with the 22d New York Volunteers during the civil war. He originated systematic rifle prac-

tice for the instruction of the National Guard, and through his efforts the Creedmoor rifle range on Long Island was established. He was president of the National Rifle Association for 25 years, and is the author of *Wingate's Manual of Rifle Practice* (1872); *The Great Cholera Riots* (1880); *On Horseback Through the Yellowstone* (1886); *History of the 22d Regiment* (1896); etc.

WIN'IFRED, WENEFRIDE, or WINEFRIDE, SAINT: according to the legend, a noble British maiden, possibly of the 7th century, whose head the Prince Caradoc cut off when she fled from his unholy proposals. The head rolled down a hill, and where it stopped a spring gushed forth; famous afterward as a place of pilgrimage, Holywell in Flintshire. She was restored to life by Saint Bueno, who replaced her head, survived the miracle 15 years, and after the death of Saint Bueno entered the nunnery of Gutherin, in Denbighshire. Her festival is observed on Nov. 3.

WINK, v. *wĭngk* [O. Dut. *wincken, wencken,* to wink. Icel. *vanka,* to wink, to rove: Ger. *winken,* to nod: Sw. *winka,* to make a sign with head, hand, or eye: Dan. *vinke,* to beckon (and see WINCE, from same root)]: to close and open the eyelids with a quick motion; to give a significant hint by a motion of the eyelids; to connive; to pretend not to see, always with *at:* N. the act of closing and opening the eyes with a quick motion; the time spent in the act of winking; a moment; a hint given by a movement of the eye. WINK'ING, imp.: N. the act of closing and opening the eyelids quickly. WINK'INGLY, ad. *-lĭ.* WINKED, pp. *wĭngkt.* WINK'ER, n. *-ėr,* one who winks; one of the blinders of a horse. FORTY WINKS, a siesta; a short nap.

WINKELRIED, ARNOLD VON: Swiss patriot. He was a knight of the Swiss canton of Unterwalden, whose self-sacrificing valor is said to have decided the victory of Sempach 1386, July 9. The Austrian troops, under Archduke Leopold, were formed into a compact body which resisted the efforts of a small body of Swiss drawn up in the form of a wedge and rushing to the attack. The Austrians were now beginning to surround their enemies when Winkelried, seeing the desperate condition of affairs, burst from the ranks, threw himself upon the ranks opposed to him, and, grasping all the pikes within his reach, buried them in his bosom, and bore them by his weight to the earth. Over his dying body his companions rushed into the opening he had made in the Austrian line and defeated their enemy with great slaughter. The truth of this legend has been much discussed, but in 1886 a monument to Winkelried was raised at Stanz, Unterwalden.

WINKLE: a local name about Long Island Sound

and New York Bay for either of the large conchs, *Fulgur* and *Sycotypus*, which are extremely common and very destructive to cultivated oysters.

WINKLEY, *wĭngk'lĭ*, HENRY: donor to education: 1803, Nov. 9—1888, Aug. 9; b. Barrington, N. H.; descendant of Samuel Winkley, who came to this country 1680, and settled in Kittery, Me. He was educated in Pembroke Academy; learned in Boston the crockery business, which he afterward carried on largely in New York and Philadelphia as importer, 1831-52. Retiring, he travelled; and later lived in Philadelphia, for its milder climate. There he died. He was not married. His unsolicited donations while living and in his will, amounting to $385,000, he distributed among evangelical New England colleges and theological seminaries.

WIN'LOCK, JOSEPH: American astronomer: b. Shelbyville, Ky., 1826, Feb. 6; d. Cambridge, Mass., 1875, June 1. He was graduated from Shelby College in 1845 and in that year was appointed professor of mathematics and astronomy there. He was engaged as one of the computers in the office of the *American Ephemeris and Nautical Almanac* in 1852-6, and in the last mentioned year was appointed professor of mathematics in the United States navy. He shortly afterward returned to the office of the *Nautical Almanac* as second superintendent, but in 1859-61 was at the Naval Academy at Annapolis, Md., in charge of the mathematical department; on the outbreak of the civil war he resumed direction of the *Almanac*. In 1866 he was appointed to the chair of astronomy at Harvard, at the same time becoming director of the observatory at Cambridge, in which offices he continued until his death. He was elected by Congress to the National Academy of Sciences in 1863, was in charge of the expedition to Kentucky to observe the solar eclipse of 1869, August, and of that to Spain in 1870, December. He made numerous and important improvements in the equipment of the Harvard Observatory, and his researches were of great value.

WINNEBAGO, *wĭn-ē-bā'gō*, LAKE: lake in Wisconsin, on the e. boundary of Winnebago co., and partly in Fond du Lac co.; length n. to s. about 30 m., greatest width 11 m.; 220 sq.m. This lake, in connection with Fox river, entering on its w. side and flowing from its n. end, is an important commercial water-way.

WINNEBAGOES, *wĭn-ē-bā'gōz:* tribe of North American Indians, of the Dakota group. They called themselves Hochungara (trout tribe) and Horoji (fish-eaters). The name Winnebagoes, given to them by the Algonkins, has been variously interpreted as referring to the foul odor of the fish remains around their habitations, and as denoting their traditional migration from the fetid, that is, salt water, meaning from the Pacific. The name was

transferred to W. Lake, in Wis., where, and in Iowa, they lived after being driven from the vicinity of Green Bay. They fought against the English 1763; with the English against the United States 1812; and against the settlers in the Black Hawk war. In 1848, when they numbered 2,531, they removed to a reservation on Blue Earth river, Minn.; in 1863 to Crow Creek, Dak.; in 1864 to Nebraska; a few, however, remained in Wis., supporting themselves. In 1890, at the reservation near Omaha, the W. numbered 1,215—617 males, 598 females. In 1900 they numbered about 1,170. The 'ration Indians' of this tribe numbered 61. No separate statistics are given of the Winnebagoshish at the Leech Lake reservation in Minnesota.

WINNEMUCCA, *wĭn'ē-mū'ka,* a lake in the western part of Nevada. It is in a desert valley in which is Pyramid and several other lakes. Winnemucca is 26 miles long, north to south, from two to five miles wide, and from 50 to 87 feet deep. Truckee River is the only inlet, which is also an inlet of Pyramid Lake. It has no apparent outlet. The mineral matter, chiefly salt, is 3.6 parts per 1,000.

WIN'NER, WIN'NING, WIN'NINGLY: see WIN.

WINNIPEG, *wĭn'ĭ-pĕg:* city of the Dominion of Canada, cap. of the province of Manitoba; at the confluence of the Assiniboin with the Red river; 50 m. s. of Lake Winnipeg; lat. 49° 56′ n., long. 97° 5′ w.

Communication.—The city is an important railway centre. Beside the main line of the Canadian Pacific railway connecting the city with east and west, the city is also connected with the different parts of the province by the Emerson, Gretna, Deloraine, Glenboro, Lac du Bonnet, and Lake Winnipeg and Teulon branches. The Canadian Northern, with its Red River Valley, Neepawa, Lake Manitoba, and Hudson's Bay branches enter the city, also the projected lines of the Grand Trunk Pacific railway. The Red river affords means of navigation and through the locks at Grand Rapids in the Saskatchewan, the city has steamboat connections for about 1,000 m. up the Saskatchewan.

Public Works.—The city stands on what was originally a bare prairie of black alluvium and its greatest development has taken place practically within the last 10 or 15 years. Streets and boulevards have been laid out and tastefully decorated with trees and there are now 10 parks in the city. The area of the city is 12,750 acres, and there are 44 m. of boulevards, 12 m. of asphalt and 30 m. of macadam pavement; 16 m. of stone sidewalk and 127 m. of plank sidewalk; 70 m. of sewers; 80 m. of watermains; and 18 m. of street railway. The city has an efficient and pure water supply; a well-equipped fire department; and an electric light system. It owns an asphalt plant, and a stone quarry. There are 8 bridges across the two rivers, those spanning the Red river con-

WINNIPEG.

1. City Hall Square. Municipal Building on the left.
2 Main Street.

necting W. with the suburb, St. Boniface, and those across the Assiniboin with Fort Rouge, the southern ward of the city.

Public Buildings and Churches.—The city contains many important and imposing buildings, being the capital of the province, the centre of Dominion Government for Western Canada, and the greatest commercial and financial city of the N. W. Chief among the administrative buildings are the legislature buildings and the lieut. gov's. residence, the city hall, court house, custom house, post-office, Fort Garry court, the land office, and the barracks and drill sheds. Of the commercial and mercantile buildings the principal are the Merchants Bank, Bank of Commerce, Union Bank, Canada Life Block, Dominion Bank, Hudson's Bay Company's department stores, Bank of British North America, McIntyre building, Ogilvie Mill. Newer buildings are: Royal Alexandra Hotel (C. P. R.), Carnegie Library, Free Press Building, T. Eaton Co., etc. There are about 70 churches in the city, representing all the leading denominations. The largest denominations are the Presbyterian, Church of England, Methodist, Roman Catholic, Lutheran, Baptist and Congregational. The most noteworthy church edifices are St. Stephen's, Holy Trinity, St. Mary's (R. C.), Knox, Augustine, Grace, New Broadway Methodist, St. Andrew's and Icelandic Lutheran. There is a Y. M. C. A. with over 1,000 members.

Charitable and Educational Institutions.—Beside numerous private hospitals there are the Winnipeg General Hospital, with its Nurse's Home and Maternity Hospital, St. Boniface General Hospital, St. Mary's Boys' Home, Children's Home, Children's Aid Shelter, Free Kindergarten Institution, and the Women's Home, and Men's Own. The cemeteries include St. John's, Kildonan, St. James', Elmwood, Brookside and St. Boniface and another Roman Catholic cemetery in the south of the city. W. maintains an excellent public school system; the Roman Catholics also maintain several parochial schools and convents, in which there are about 800 pupils. The public schools number 21; there are 209 teachers and 10 special instructors in industrial and scientific pursuits; and the pupils enrolled in 1906 were 13,445. For higher education there are the University of Manitoba with its group of affiliated colleges—St. Boniface (R. C.), St. John's (Church of England), Manitoba (Presb.), Wesley (Meth.), College of Medicine and College of Pharmacy—Havergal College (Church of England), and St. Mary's Academy for Girls (R. C.). There are also a Normal School for the training of teachers and a Carnegie Library, with about 20,000 volumes.

Industries.—W. is the centre of the wholesale and jobbing trade of the Canadian West. It is the largest wheat exporting centre on the American continent, in 1906 the shipments aggregating 53,000,000 bu. The city is also an important manufacturing centre, the Lac du

Bonnet electric power on the Winnipeg being a large factor in the development of its manufacturing industries. The chief manufactories are oatmeal, flour and grist mills, carriage works, soda-water works, sash, door and box works, oil mills, breweries, bookbinding establishments, saw-mills, marble works, coffee and spice mills, tanneries and cigar factories. There are also manufactures of furniture and upholstery, clothing, brooms and brushes, awnings, tents and mattresses, harness and saddlery, jewelry, soap, plumbing and gas fixtures, tinware, and biscuit, confectionery and bakery products, etc.

Banking and Finance.—The city is the financial headquarters of the region, and is also third in importance of the financial centres of the Dominion, being outranked only by Montreal and Toronto. There are 13 chartered banks in the city, with a paid up capital of about $50,000,000 and representing nearly all of the leading banks of Canada. The bank clearings in 1903 amounted to $163,105,124. There are also a number of loan and investment companies, as well as fire and life insurance companies. The annual expenditure of the city for maintenance and improvement is about $800,000.

Government and History.—The city government is vested in a Mayor elected by general vote and a board of 12 councilmen, elected from the six wards into which the city is divided. Beginning with the year 1907 there is a Board of Control, of four members. There is also a separate organization of trustees for the government of schools, also elected by wards.

A post of the Hudson's Bay Company, called Fort Garry, was established here about 1820, and the village which grew up in the neighborhood was known by that name until 1873, when the city of W. was incorporated. The original fort, which was erected in 1822, was replaced in 1835 by a new structure of stone, but this is now dismantled and almost obliterated. It was the seat of government in the Hudson's Bay Company and Red River Settlement and became famous as the seat of Louis Riel's short-lived government 1869-70. In 1882 the pop. doubled in a few months, there was enormous rise in values, and speculation became wild. This undue inflation was followed the next year by a collapse, and a general prostration of business enterprises, with rapid diminution of the population. But the city has risen again and entered on a career of great prosperity. Pop. (1881) 7,985; (1886) 20,238; (1901) 42,340; (1907) estimated 85,000.

WIN'NIPEG, LAKE: large lake of Brit. N. America; 90 m. n. of the state of Minn., about 350 m. n.w. of Lake Superior. 50°—54° n. lat., 96°—100° w. long.; 264 m. long, 35 m. broad; 9,000 sq. m. Its tributaries drain 400,000 sq. m. Of these, the largest is the Saskatchewan. The Winnipeg river, 300 m. long, flowing n.w., connects Lake W. with the Lake of the Woods (q.v.) and with Rainy Lake (q.v.).

The Red River of the North (q.v.) and its great branch, the Assiniboine (q.v.), discharge their waters at the s. extremity of Lake Winnipeg, after flowing through a region to the s. and s.w., which presents a singular and important combination of prairie and woodland. Nelson River (q.v.), issuing from the n. end of Lake Winnipeg, is its principal outlet.

WINNIPEGOSIS, *wĭn-ĭ-pe-gō'sĭs* (or WINNIPIGOOS, *wĭn'ĭ-pe-gôs*, or LITTLE WINNIPEG), LAKE: in Manitoba and Saskatchewan, about 50 m. w. of Lake Winnipeg; length n. to s. about 120 m., average width 25 m.; about 2,000 sq.m. Red Deer and Swan rivers and Lake Dauphin discharge into it; and its outlet is through Water Hen river, Lake Manitoba, and the Little Saskatchewan river into Lake Winnipeg. It is not deep, but is navigable by vessels drawing 10 ft. of water.

WINNIPESAUKEE (or WINIPISIOGEE), *wĭn-ĭ-pe-saw'-kē*, LAKE: largest lake in New Hampshire, and largest wholly within New England—except the lakes in Maine; about 25 m. n.n.e. of Concord, in Belknap and Carroll cos.; length 19 m., extreme breadth 8¼ m.; though, as the lake is exceedingly irregular in form, its water-area (about 72 sq.m.) is less than these dimensions would represent—extensive bays, partly separated from the main body by islands or peninsulas, indenting the shores on every side. This irregular outline gives remarkable picturesqueness to the scenery, which in many parts is of wonderful beauty, especially as viewed from the steamboats which navigate the lake: the scene constantly changes—the shores now receding and opening far among the hills, now suddenly closing in as if to dispute the course. Mt. Washington and other mountains are visible from the lake. The depth in general is not great, probably nowhere more than 200 ft.; though in many places the shore is formed by high steep hills. The shore-line is about 183 m. in length. The islands of all sizes number 274: many are beautifully wooded. Lake Winnipesaukee is about 500 ft. above sea level. Its waters are remarkably pure and clear. The outlet is on the n.w. shore, at The Weirs—through the Winnipesaukee river and its expansions, Lake Paugus, Round Bay, Winnisquam Lake, etc.—to Franklin, where it unites with the Pemigewasset river (whose waters come from Lake Asquam and from the Franconia Mountains) to form the Merrimac. The name, which is said to have been spelled in 131 different ways, is of Indian origin, meaning 'The Beautiful Water of the High Place.'

WINNOW, v. *wĭn'nō* [AS. *windwian*, to winnow—from *wind*, wind (see WIND): OHG. *wintôn*, to blow gently backward and forward: Bav. *windel*, a fan]: to expose to a current of air in order to remove the chaff from; to separate from the chaff by means of the wind or by a current of air; to separate by fanning; to sift; to ex-

amine; in *OE.*, to beat as with the wings. WIN'NOWING, imp.: N. the act of separating the chaff from grain. WIN'NOWED, pp. *-nōd.* WIN'NOWER, n. *-ėr,* one who or that which winnows.

WINNOWING-MACHINE. See FANNERS; BLOWING-MACHINES.

WINNS'BORO, S. C.: city, county-seat of Fairfield co.; on the Southern Railroad; about 34 m. n. of Columbia. It is in an agricultural region, and in the vicinity are large stone quarters. At one time the city manufactured all the cotton-gins used in the United States. The educational institutions are Mount Zion Institute, established in 1878, as a public high school, but chartered as a school in 1777, and graded elementary schools. The bank has a capital of $120,700. Pop. (1890) 1,738; (1900) 1,765; (1910 est.) 2,100.

WINONA, *wĭ-nō'na:* city, capital of Winona co., Minn.; on the Mississippi river, and on the Chicago and Northwestern, the Chicago, Milwaukee and St. Paul, the Chicago, Burlington and Northern, the Green Bay, Winona and St. Paul, and the Winona and Southwestern railroads; 27 m. n.w. of La Crosse, 104 m. s.e. of St. Paul, 297 m. w.n.w. of Chicago. It has a beautiful and healthful site, and ranks high among the cities of the w. in commercial and manufacturing importance. It is attractively laid out, well built, lighted with gas and electricity, and provided with waterworks, paid fire department and street railways. There are 2 national banks, 2 state banks, 1 private bank; and 1 daily, 7 weekly and 3 monthly periodicals. Conspicuous among its buildings are the State Normal School (cost $140,000), U. S. government building (cost $150,000), county court-house (cost $130,000), 2 high schools (cost $55,000 and $35,000), 4 grammar schools (cost $150,000), State Soldiers' Orphans' Home, city-hall, public library and hospital. Winona is one of the largest grain shipping points in United States. The principal industries include the making of agricultural implements, carriages and wagons, insulating materials, patent medicines and malted liquors. There are several large flour and lumber mills. The factories of Winona are more than 150 in number, with a capital exceeding $6,000,000. These factories employ over 2,000 people. There are excellent transportation facilities at Winona and large shipments of grain, hay, vegetables, lumber, and live-stock are made annually. There are more than 20 churches in Winona, also an Roman Catholic cathedral. The first white settlement was made at Winona 1851; the town was laid out 1852; and it received a city charter 1857. Pop. (1910) 18,583.

WINONA, Miss.: town, county-seat of Montgomery co.; on the Southern and the Illinois Central railroads; about 85 m. n. by e. of Jackson. It is in an agricultural

region in which cotton and grain are the chief products. It has flour and grist mills, cotton gins, and agricultural implement works. The two banks have a combined capital of $150,000. The high school was established in 1887. Pop. 2,600.

WINOOS'KI, Vt.: village in Chittenden co.; on the Central Vermont railroad; 2 m. n. of Burlington. It has an electric railway to Burlington. It is in a fertile agricultural region, and has considerable manufacturing interests. The chief industrial establishments are sash, door, and blinds factories, wagon and carriage works, cotton and woolen mills, iron and brass works, machine shops, flour mill, and furniture factory. It has a high school, Providence Academy (Roman Catholic), public and parish schools, and the Fanny Allen Hospital. There is one bank. Pop. (1900) 3,783; (1910) 4,520.

WINOOSKI, or ONION: a river in Vermont, which has its rise in the northeastern part of the state, flows west, breaking through the Green Mountains, and enters Lake Champlain about 5 m. n.w. of Burlington. Total length about 100 m. In several places it has cut deep picturesque gorges, and it has several falls. The falls at Middlesex and Winooski furnish extensive water-power for manufacturing. The valley of the Winooski is noted for its beautiful scenery.

WINSEY, n. *wĭn'sĭ:* a variant of WINCEY (q.v.).

WINSLOW, *wĭnz'lō,* EDWARD: governor of Plymouth colony: 1595, Oct. 18—1655, May 8; b. Droitwich, England. Meeting with the Rev. John Robinson in Leyden, he united with the church of the exiles there, and sailed with the first Pilgrims in the *Mayflower.* The next year he was commissioned to make a treaty with Massasoit; in 1623 he was the means of restoring that sachem from severe sickness, and for reward received information of an Indian plot to destroy the profligate Weston colony at what was afterward named Weymouth. This led to the expedition by Capt. Miles Standish, the Plymouth colonists fearing that an attack on themselves would follow. The same year, 1623, Winslow visited England, and brought to the colony 1624 the first cattle. He was elected assistant governor every year 1624-47, except 1633-36 and 1644, when he was governor. In 1624 he again visited England, to secure evidence against a preacher, John Lyford, who had been sent to the colony and had written slanderous letters to the old country. In 1633 he sent a vessel to settle disputes with Dutch traders on the Connecticut river, and the vessel, passing the Dutch fort, established a post on the site of the present city of Hartford. On his third visit to England, 1635, to defend the colonies against certain accusations, he was imprisoned nearly 4 months through the influence of Archbishop Laud. He was commissioner 1643 in or-

ganizing the confederation known as the United Colonies of New England. His fourth visit to England, 1646, was on an errand similar to those previous, and resulted, moreover, in the incorporation by parliament of the Society for the Propagation of the Gospel in New England among the Indians. He remained in England until 1654, when he was a commissioner on claims against Denmark for injuries to English trade, and also was chief of the commission under Cromwell which sailed with an expedition against the Spaniards in the West Indies. On the way from Santo Domingo to Jamaica, Winslow died of fever, and was buried at sea. He was remarkable for business ability, for skill in managing negotiations, and for a more tolerant spirit than was general among leading men in his time. His residence from 1637 was on the ground afterward occupied by Daniel Webster at Marshfield. Besides his part in *Bradford's and Winslow's Journal* (1622), relating to the first year of the colony, he wrote a further account, *Good Newes from New England*, known also as *Winslow's Relation* (written 1623-4). His *Hypocrisie Unmasked*, and *New England's Salamander*, were answers to defamers of the colony. Besides letters, his other remains include *The Glorious Progress of the Gospel among the Indians of New England* (1649), and *A Platform for Church Discipline in New England* (1653).

WINS'LOW, Hubbard, D.D.: author and Congl. minister: 1799, Oct. 30—1864, Aug. 13; b. Williston, Vt.; brother of the Rev. Miron Winslow. He graduated at Yale 1825, and studied theology at Andover Theol. Sem. and at Yale was Congl. pastor at Litchfield, Conn., 1827-8; Dover, N. H., 1828-31; the Bowdoin St. Church, Boston, 1832-44; conducted the Mount Vernon Institute, Boston, 1844-53; ministered to the 1st Presb. Church, Geneva, N. Y., 1857-59; and afterward was pastor of the 50th St. Presb. Church, New York. He died in his native place. Among his many publications were: *Doctrine of the Trinity* (1831); *Controversial Theology* (1832); *Philosophical Papers* (1833); *Christianity applied to Civil and Social Relations* (1835); *Young Man's Aid to Knowledge* (1836); *Natural Science and Revelation* (1841); *Intellectual Philosophy* (1852); *Moral Philosophy* (1856); and *The Hidden Life* (1863). His tract *Are You a Christian?* had a distribution of 250,000 copies, and some of his books a wide circulation.

WINS'LOW, John: soldier: 1702, May 27—1774, Apr. 17; b. Plymouth, Mass.; great-grandson of Gov. Edward Winslow of Plymouth colony. He served as capt. in the Brit. expedition against Cuba 1740; was commissioner to Fort St. George, Me., to adjust disputes with the Indians 1752; and under orders from Gen. William Shirley removed the Acadians from Nova Scotia 1755. As maj.gen. he commanded the forces at Fort William

Henry on Lake George 1756, and served as maj.gen. in the Kennebec expedition against the French 1758-9. He became judge of the court of common pleas in Plymouth co. 1762, assisted in determining the e. boundary of Maine, and was active in the Stamp Act controversy. Winslow, Me., is named in his honor.

WINS'LOW, JOHN: soldier of the revolution: 1753, Oct. 29—1819, Nov. 29; b. Boston. He was the first to find the body of Gen. Joseph Warren on the field of Bunker Hill after the battle. Receiving the appointment of deputy paymaster-gen., he was in service at the assault on Quebec 1775, and at the battle of Ticonderoga 1776, on both occasions saving the army treasure and papers from capture. In the operations against Burgoyne he was in command of a battery, and was afterward at West Point and White Plains. In 1799 he commanded a Boston brigade, and 1809 was maj.gen. of state militia. To him is ascribed the preserving of the communion service of the Old South Church in Boston, from the hands of the British, at the beginning of the revolution. He died in Boston.

WINS'LOW, JOHN ANCRUM: naval officer, victor over the Confederate cruiser *Alabama:* 1811, Nov. 19—1873, Sep. 29; b. Wilmington, N. C.; descendant of a bro. of Gov. Edward Winslow of the Plymouth colony. From midshipman 1827 he rose to lieut. 1839; had part in the Mexican war, and for gallantry was put in command of a captured vessel; was in various service in the Gulf, at Boston, and on the Pacific, until promoted commander 1861 in the Mississippi flotilla, where he was disabled by an accident. The next year he was made capt., in command of the *Kearsarge,* 7 guns, and blockaded the Confederate *Alabama,* 8 guns in the harbor of Cherbourg, France. Accepting a challenge by Capt. Raphael Semmes, he fought and sank the *Alabama* 7 m. out at sea, his shots telling severely, while his own ship, having some rude armor-protection amidships, suffered little, and he had but three men wounded (only one fatally), against 40 of the *Alabama* killed. He fired 173 shots, the enemy 370, in the 80 minutes' duration of the battle. See ALABAMA, THE. He was promoted commodore; received the thanks of congress; commanded the Gulf squadron 1866-7; was on the board of examiners 1868-9; was chief of the Pacific fleet 1870-72; and commissioned rear admiral 1870. He died in Boston.

WINS'LOW: JOSIAH: governor of Plymouth colony: 1629-1680, Dec. 18; b. Plymouth, Mass.; son of Gov. Edward Winslow. He was member of the general court 1643; asst.gov. 1657-73; gov. 1673-80. Besides these offices, he held that of commissioner of the United Colonies 1658-72; capt. of Marshfield militia 1652; milit. chief of the colony 1659, and was intrepid in seizing a sachem, successor of Massasoit; and gen.-in-chief of the

United Colonies 1675, conducting the war against King Philip, while he dealt justly with friendly Indians. He was the first native gov. and the first native general-in-chief in New England. He showed a tolerant spirit twice, officially, in the history of the Quaker persecution. Under his administration the first public school was opened 1674-5. A poem by him commemorating Gov. Bradford was printed in George Morton's *Memoriall.*

WINS'LOW, MIRON, D.D., LL.D: missionary: 1789, Dec. 11—1864, Oct. 22; b. Williston, Vt.; descendant of a bro. of Gov. Edward Winslow. He graduated at Middlebury Coll. 1815, and at Andover Theol. Sem. 1818. The next year he went as missionary of the Amer. Board, and founded a mission in Ceylon, and later the Oodooville Seminary. Removing to Madras, India, 1836, he established a mission, seven schools, and a college. His most laborious work was the translation of the Bible into the Tamil language, and the production of a Tamil and English dictionary, mostly original work, and containing 68,000 words and definitions, on which he spent 20 years. He also published *Sketch of Missions* (1819); *Memoir of Harriet Lathrop Winslow,* his first wife (1835); and *Hints on Missions in India* (1856). The *Remains of Mrs. Winslow,* his second wife, was published 1851.

WINS'LOW, WILLIAM COPLEY, D.D., LL.D., D.C.L., PH.D.: archæologist: b. Boston, 1840, Jan. 13; son of Hubbard Winslow, D.D. He graduated at Hamilton Coll. 1862, and from the Prot. Episc. theol. seminary, New York. After brief editorial work in New York, he removed to Boston, where he has since been engaged in researches, preaching at intervals. He has given special attention to biblical archæology, and particularly Egyptology. For the Boston Museum of Fine Arts, he procured a statue of Rameses II., the Pharaoh of the Exodus, which was found among the ruins of Zoar. He has received many honorary degrees, including LL.D. from St. Andrews, Scotland, L.H.D. from Columbia Coll., and D.C.L. from King's College. He has written: *Israel in Egypt; The Store City of Pithom* (1885); *A Greek City in Egypt* (1887); *The Egyptian Collection in Boston* (1890); *The Pilgrim Fathers in Holland* (1891); *Governor Edward Winslow;* etc.

WINSOME, a. *wĭn'sŭm* [AS. *wynsum,* pleasant—from *wyn,* joy: from same root as *win*]: pleasant; merry; gay; light-hearted; comely; fitted to attract or charm; winning. WIN'SOMELY, ad. *-lĭ* WINSOMENESS, n. *nĕs,* agreeableness; attractiveness.

WINSOR, *wĭn'zer,* JUSTIN, LL.D.: bibliographer: 1831, Jan. 2—1897, Oct. 22; b. Boston. He was a student at Harvard and at Heidelberg; supt. of the Boston Public Library 1868-77, and, since, librarian of Harvard; first pres. of the Amer. Library Assoc., pres. of the Amer. Hist. Assoc., and sec. of the Mass. Hist. Soc. He contrib-

uted much to periodicals, and published *History of Duxbury, Mass.* (1849); *Reader's Hand-book of the American Revolution* (1880); and pamphlets, such as Gov. Bradford's history, Arnold's expedition, the Montcalm spurious letters, manuscript sources of Amer. history, etc.; also bibliographies of Shakespeare, of Halliwell-Phillips, of Ptolemy's geography, etc.; and he edited library and other publications, including a series of *Biographical Contributions* relating to Amer. history.

WIN'STED: borough, county-seat of Litchfield co., Conn.; on the Mad and Still rivers, and on the Central N. E. and the New York, N. H. and H. railroads; about 28 m. n.w. of Hartford. It is in an agricultural region, and is the commercial and industrial centre for quite an extent of country. The Mad river furnishes considerable water-power, which is utilized for manufactories for cutlery, clocks, leather, spool silk, edge tools, pins, hosiery, and undertakers' supplies. The town of Winchester, in which is the borough of Winsted, had, in 1900, 133 manufacturing establishments, capitalized for $2,971,429, and employing 1,746 wage earners. The value of the annual products was $2,928,822. The educational institutions are Gilbert High School, Saint Margaret of Cortona Academy, public and parish schools, and the Memorial and Gilbert School libraries. Located in Winsted are the Litchfield County Hospital of Winchester, Old People's Home, and the Gilbert Home for Indigent Children. There are four banks. Winsted receives considerable water-power from Long Lake, a body of water on the western side of the borough; and the water-supply comes from Crystal Lake.

The place was settled in 1756. The town of Winchester was founded in 1771, and Winsted was incorporated as a borough in 1858. The government is vested in a warden and six burgesses. Pop. (1910) 7,754. Pop. of the town of Winchester (1910) 8,679.

WIN'STON, John Anthony: American politician: b. Madison co., Ala., 112, Sep. 4; d. Mobile, Ala., 1871, Dec. 21. He was educated at Lagrange College, Ala., and at the University of Nashville, Tenn., and subsequently engaged as a cotton planter and commission merchant. He was elected to the State Assembly in 1839-40, and in 1842; to the State Senate in 1845, serving until 1852; and was president of that body in 1845-8. At the Baltimore convention of 1848 he was the recognized leader of the Alabama democracy, and in 1853-6 was governor of his state. He was the first native-born governor of Alabama, and by his refusal to sign certain bills for aiding railroad companies by state loans he gained the title of the 'veto governor.' His course was sanctioned, however, by the people, as he was reëlected in 1855 and his measures were sustained by the legislature in the following session. He was a delegate to

the Charleston convention of 1860 and opposed secession, but later became a colonel in the Confederate army. He commanded a brigade in the Peninsular campaign, and was conspicuous for gallantry at Seven Pines, but his health compelled his retirement from the army soon afterward, and he took no further active part in the war. He was a member of the state constitutional convention in 1865, and in 1866 was elected to the United States Senate, but was refused admission.

WINSTON, N. C. See WINSTON-SALEM.

WINSTON-SALEM: twin city, county-seat of Forsyth co., N. C.; on the Norfolk and W. and the Southern railroads; 115 m. n. of Raleigh and 28 m. w. of Greensboro. Winston and Salem have independent municipalities, but as they are one commercially and industrially, they are usually called Winston-Salem. The city is the commercial centre of a fertile agricultural region, especially noted for its tobacco. It is a manufacturing city of importance; the tobacco manufacture is the leading industry; there are large tobacco warehouses, and plug and leaf tobacco factories, representing about $2,000,000 capital invested; other industrial establishments include chemical works (the largest in the south), roller mills, cotton mills, knitting mills, a box factory, machine shops and foundries. The business is mostly concentrated in Winston, while Salem is mainly residential. The streets are broad and well paved, and there is a large park; the city has an electric railway, and two systems of water-works, one under the ownership of the municipal government of Winston. There is an excellent public school system, including a graded school for colored children; and the city is also the seat of the Salem Academy and College, a Moravian school for young women, founded in 1802; the Salem Boys' School (Moravian); and the Slater Industrial and Normal School, a non-sectarian institution for the colored race.

Salem was founded, in 1766, by Moravians as a church community. For a number of years the town was governed by the church in affairs secular as well as religious. The Moravian bishop, Count Zinzendorf, made the plans for the city and for the government which existed during the first years. The government of Salem is now administered under the revised charter of 1891; the government of Winston under the charter of 1899; in both cases the mayor is elected every two years. Pop. Winston (1910) 17,167; pop. Salem (1910) 5,533.

WINTER, n. *wĭn'tẽr* [Dut. *winter;* Goth. *vintrus;* Dan. *vinter;* Icel. *vetr;* Ger. *winter,* winter; *wetter,* storm, weather: Pol. *wiatr,* wind]: the cold season of the year, astronomically reckoned in n. latitudes from the time when the sun enters Capricorn (about Dec. 21) to the equinox in Mar., but popularly considered in the United

States to include Dec., Jan., and Feb., and in the United Kingdom, Nov., Dec., and Jan.; when it is winter in the n. hemisphere, it is summer in the s. hemisphere (see SEASONS): V. to pass the winter; to feed or manage during winter: ADJ. pertaining to winter. WIN'TERING, imp. N. the act of passing the winter; the act of keeping or feeding during the winter. WIN'TRY, a. *-trĭ*, or WIN'TERY, a. *-ter-ĭ*, pertaining to winter; cold; stormy. WIN'TERLY, a. *-ter-lĭ*, suitable for winter; of a winter kind. WIN'TROUS, a. *-trŭs*, in *OE.*, wintry. WINTER-ACONITE, a yellow wild-flower, *Eranthis hiemālis*, ord. *Ranunculāceæ*. WINTER SOLSTICE: see SOLSTICE. WINTER QUARTERS, a station or residence for the winter months. WINTER-TIDE, the winter season.

WIN'TER, WILLIAM: poet and critic: b. Gloucester, Mass., 1836, July 15. After graduation at the Harvard Law School, he engaged in journalism and magazine writing, and for a quarter of a century has been the dramatic critic of the New York *Tribune*. He founded a library at Stapleton, Staten Island, 1886. His criticism is genial and considerate, though unfaltering in its moral tone; and his style has remarkable grace and charm. He published volumes of poems 1854-78, collected in *Poems, Complete Edition* (1881); *Life of Edwin Booth* (1871); *The Jeffersons* (1881); *English Rambles, and Other Fugitive Pieces* (1884); *Henry Irving* (1885); *Stage-life of Mary Anderson* (1886); *Shakespeare's England* (1886); *The Wanderers*, poems (1888); *Shadows of the Stage* (1892); *Life and Art of Edwin Booth* (1893); *Life and Art of Joseph Jefferson* (1894); *Shakespearean and miscellaneous plays of Edwin Booth* (1899); and he has edited the poems of George Arnold, of John Brougham (with his life and stories), and of Fitz-James O'Brien.

WIN'TERBER'RY: one of several N. American shrubs of the genus *Ilex* and nat. order *Aquifoliaceæ;* specifically the *Ilex verticillata*, Black Alder, or Virginian Winterberry, which grows to a height of 6 to 10 or 12 ft., and bears deciduous leaves and small white flowers in clusters, followed by shining scarlet berries about the size of a pea (see HOLLY). Another species, *I. lævigata*, or Smooth Winterberry, has larger berries, which ripen earlier and are generally solitary.

WINTERGREEN, *win'ter-grēn:* any one of several plants of the genera *Gaultheria, Pyrola*, or *Chimaphila*, nat. order *Ericaceæ*, which produce succulent berries yielding a fragrant volatile oil. In the United States the name is commonly applied to the Aramatic or Creeping Wintergreen (*G. procumbens*), whose bright red berries have the spicy flavor of Sweet Birch. The Wintergreen or Shin-leaf (*Pyrola*), of which we have a number of species, has a root-cluster of rounded leaves and a flower-stalk bearing round pods, not berries. The Spotted Win-

tergreen or Pipsissewa (*Chimaphila maculata*), has the leaves variegated with white, and also bears a pod.

WIN'TERGREEN, OIL OF: *Gaultheric Acid,* an essential oil yielded by the flowers of the *Gaultheria procumbens* (see GAULTHERIA), consisting chiefly of salicylate of methyl, mixed with a small quantity of a hydrocarbon, termed *Gaultherilene,* which is isomeric with oil of turpentine, and which, being more volatile than the salicylate of methyl, is easily separated from it. The latter is so much the more abundant constituent of the oil, that the two may be regarded as identical. This oil is not only yielded by distillation of other plants, e.g., leaves and flowers of *Monotropa hypopitys,* and the bark of *Betula lenta,* but may be artificially formed by distilling a mixture of 2 parts of crystallized salicylic acid, 2 of anhydrous wood-spirit, and 1 part of oil of vitriol. In whatever mode it is obtained, it presents the appearance of a colorless or yellow oil, of powerful, agreeable, and persistent odor; and hence it is largely used in confectionery, and in disguising unpleasant medicines.

WINTER MOTH (*Cheimatobia brumata*): species of moth, whose caterpillar is very injurious to plum-trees. It has long been well known as common in many parts of the continent of Europe. In the vale of Evesham, in Worcestershire, England, famed for its plum plantations, damage has been done by it to the extent of $100,000 to $150,000 in a year. It is an insect about half an inch long, of light-brown color. The male alone has wings. The eggs are hatched early in spring, and the caterpillars, at first very minute, feed on the buds of the plum. The eggs are deposited on trees, chiefly around the base of the buds, and in chinks of the bark. Like most of the moths, this insect is nocturnal. During night the males fly about the trees, and the wingless females creep up their stems. The best mode of preventing its ravages is to surround the stems of the trees with something over which the females cannot climb from the ground, in which they pass their chrysalis stage.

WINTER'S BARK, *wĭn'terz bârk* [after Capt. *Winter,* who first brought it from the Straights of Magellan 1579]: a stimulant, aromatic and tonic bark, resembling cinnamon, the product of the *Drimys Winteri,* or *D. aromatĭca,* a forest shrub or tree, native of some mountainous parts of S. America, and abundant in the lower grounds of Cape Horn and Staten Island in Tierra del Fuego—an evergreen, with laurel-like leaves, corymbs of white flowers, and many seeded berries. This shrub belongs to the nat. order *Magnoliaceæ,* and to a section of it called *Winteraceæ,* distinguished chiefly by dotted leaves and aromatic qualities. The Star Anise (*Illicium*) is nearly allied to it. The bark of other species of *Drimys* has similar properties to Winter's Bark—e.g., that of

D. Granatensis, much used in Brazil as remedy for colic, and of *D. axillaris,* a New Zealand tree.

WIN'TERSET: city, county-seat of Madison co., Iowa; on the Chicago, Rock Island and Pacific railroad; about 45 m. s.w. of Des Moines. It is in an agricultural region in which the chief products are wheat, corn, and hay. In the vicinity are large stone quarries. It has flour mill, creameries, machine shop, and coal and stock yards. It has an extensive trade in farm and dairy products. The four banks have a combined capital of $125,000. There are 10 churches, public and private schools, and a public library, founded in 1891. Pop. 3,500.

WINTERTHUR: town of Switzerland, in the canton of Zürich; on the Eulach; 14 m. n.e. of Zürich. It has a fine town-house, a Reformed and Roman Catholic church, a gymnasium, and a town library of 20,000 vols. Its situation among hills, many of which are clothed with vines, is specially pleasant. Cotton-spinning, cotton-printing, dyeing, and manufacture of machinery and weapons, are actively carried on. Pop. (1900) 22,335.

WINTHER, Rasmus Villads Christian Ferdinand: Danish poet: b. Fensmark, Zealand, Denmark, 1796, July 29; d. Paris 1876, Dec. 30. He was educated at the University of Copenhagen and became immediately popular on the appearance in 1828 of his first volume of poems. He was one of the truest interpreters of the Danish national character. Some of his numerous publications are: *Sang og Sagn* (Song and Legend) (1841); *Lyriske Digte* (Lyrical Poems) (1849); *Nye Digte* (New Poems) (1850); *Hjortens Flugt* (The Flight of the Hart) (1856), a lyric romance of the Danish Middle Ages, his greatest work.

WINTHROP, Fitz-John: American colonial governor, son of John Winthrop (1606-76): b. Ipswich, Mass., 1638, Mar. 14; d. Boston, 1707, Nov. 16. He studied at Harvard and afterward in England, where he served in the army of the Protectorate until the Restoration. Returning to Connecticut in 1663 he was elected to the Assembly in 1671, served as major in King Philip's war and in 1686 as a member of the council of Gov. Andros. He was a magistrate in 1689, major-general commanding the expedition against Quebec in 1690, Connecticut agent at London 1693-7, and governor of Connecticut from 1698 till his death.

WINTHROP, *wĭn'throp,* John: Puritan founder of the Massachusetts colony: 1587, Jan. 12—1649, Mar. 26 [date of birth, new style, Jan. 22]: b. at Edwardston, near Groton, Suffolk, England; only son of Adam Winthrop, lord of the manor of Groton. He was admitted to Trinity College, Cambridge, 1602, Dec. 8; was married to a young lady of family and wealth 1605, Apr. 16, whose death, 1615, June, left him with six children; was

a second time married, but his wife died with her infant, a year later; and 1618, Apr., he was again married, to Margaret, daughter of Sir John Tyndal.

From 1619 to 1629 Winthrop was active in the practice of the law, much of the time under commission as a magistrate or justice. He had early developed a strongly religious bent and a character of much gravity and dignity, modified by remarkable tenderness of affection and warmth of sympathy. About 1629, June, he had to give up his London office as attorney of the court of wards, and his law chamber there. He was already considering the hope dawning upon not a few of escaping vexations and prescriptions by removal to New England. In old England the king was practically exercising despotic authority. Eminent men who opposed forced loans, secret tribunals, and oppression in matters of religion, were imprisoned. Puritanism, with which Winthrop, though a member of the Church of England, warmly sympathized, was counted a grievous offense, and was arbitrarily repressed by Laud, then bishop of London, and by other powerful prelates. In 1629, Aug. 26, Winthrop was one of 12 men of family, character, culture, and means, who signed an agreement, at Cambridge, 'to pass the seas, to inhabit and continue in New England,' on condition that they carry 'the whole government' with them, to maintain a church and state with entire liberty. He had not been one of the earliest in the movement; yet, Oct. 20, he was 'chosen to be gov., as he said, 'without my seeking or expectation,' on the ground of his high character and conspicuous qualifications. Embarking at Southampton 1630, Mar. 22, and after detentions getting finally to sea Apr. 8, with about 700 persons in 11 ships, Winthrop touched at Salem June 12, and June 17 sailed into Boston harbor. Sep. 7 names were given to Dorchester, Watertown, and Boston; and Oct. 19 108 persons were admitted freemen. Excessive privations drove a hundred or more to sail back for England, and more than 200 had died before Dec.; but Winthrop wrote: 'I do not repent my coming. I would not have altered my course though I had foreseen all these afflictions. I never had more content of mind;' and the historian of New England can now say that 'during Winthrop's last ten years, nowhere else in the world had Englishmen been so happy as under the generous government which his mind had inspired and regulated;' and that at his death 'he closed his eyes upon a scene of rare prosperity, which he, laboring with many other good and able men, had been the chief instrument in creating.' He was 12 times elected gov., 1630-33, 1637-39, 1642, 1643, and 1646-48. That he was not continuously chosen was due to his strong insistence on the principle that true liberty requires wise and secure authority. Precisely as Washington and the makers of the constitution of 1787, Winthrop foresaw the folly and weakness of a loose

democracy. 'I observe a great mistake in the country about liberty,' he said, and he conceived 'two errors' of an extreme Puritanism to be, electing to office 'men who had no learning nor judgment, though holy and religious,' and allowing 'some one or other of their ministers' to assume 'the main burden for managaing of state business.' A few of the ministers, and all the extremists of democracy, in Boston especially, more than once kept Winthrop out of office, but never for long; and when a federal movement created at Boston, 1643, May 19, 'The United Colonies of New England'—Massachusetts, Plymouth, Connecticut, and New Haven—Winthrop was the first pres., and more than any other Puritan founder he embodied for both state and church the broad forethought of combined liberty and law, which, taking its characteristic development in New England, had—in its political bearings—such strength in Washington, and such vindication in Lincoln.—See PURITANS: PILGRIM FATHERS.

Winthrop began, 1630, Mar. 29, on Easter Monday, a week after the sailing from Southampton, a journel designed to serve as annals. Continued to 1649, Jan. 11, vol. I. was published in Hartford 1790; but the continuation was discovered 1816 in the tower of the Old South Church, Boston, and the whole was eventually published as *The History of New England from 1630 to 1649*, with notes, etc., by James Savage (vol. I. 1825; II. 1826; new ed., richer in notes, etc., 1853).

WIN'THROP, JOHN, Jr.: Puritan founder of Connecticut; 1606, Feb. 12—1676, Apr. 5; b. Groton, England; son of John Winthrop, who was founder of Massachusetts colony. He was early at school at Bury St. Edmunds; was for several years a student at Trinity College, Dublin; studied law in London, and was admitted to the Inner Temple 1624, Feb. 28; entered the naval service, and was in the expedition to the Isle of Rhé, 1627, June—Sep.; and the next year, after concluding not to sail with Endicott, June 28, to New England, he started, June 18, for a European and oriental trip, to Italy and on to Constantinople, thence to Venice, to Amsterdam, and back to London. Heartily approving, 1629, his father's decisions as to removal to New England, he accompanied his mother and her children (1631, Aug. 15—Nov. 2) to Boston; was chosen one of the magistrates 1632, May; began a settlement at Agawam (Ipswich); went to England 1634, and returned 1635, Oct., 'with commission to begin a plantation at Connecticut, and to be gov. there;' founded the colony at Saybrook; returned the next year to Ipswich; sailed again for England 1641, Aug. 3; returned 1643 to Mass., with stock and men 'to begin an iron-work' (at Braintree); made a plantation at Pequot river 1646; was commissioned a magistrate by Conn. 1647, Sep. 9; became a freeman of Conn. 1650, May, and was chosen a magis-

trate annually 1651-56; and elected gov. 1657, deputy-gov. 1658, and under a special law reëlected gov. every year until the royal charter came into force, under which he continued gov. to his death. He went to England 1661, as the colony's agent to secure a charter after the Restoration, and obtained one 1662, May 10, which not only gave remarkable liberties, but authorized Conn. to absorb the colony of New Haven, thus extinguishing one of the Union of Four. Gov. Winthrop was an early member and a correspondent of the Royal Soc., London.

WIN'THROP, JOHN, LL.D.: scientist: 1714, Dec. 19—1779, May 3; b. Boston, Mass.; son of Chief-justice Adam Winthrop. A graduate of Harvard 1732, and prof. there of nat. philos. and mathematics from 1738 to his death, he was the foremost pioneer of scientific inquiry and teaching in New England, an original investigator in several depts., one of whose views were in advance of the science of his time, and a scholar of great acquirements. In 1740 and 61 he observed the transit of Mercury, in the second instance making a journey to Newfoundland, under colony govt. auspices. His observations on comets and on earthquakes were valuable contributions to science. He was several years a judge of probate, was on the gov.'s council 1773-4, and favored the revolution.

WIN'THROP, ROBERT CHARLES, LL.D.: 1809, May 12—1894, Nov. 16; statesman; b. Boston; 7th in descent from John Winthrop, the Puritan founder. He was graduated at Harvard 1828, studied law with Daniel Webster, and was admitted to the bar 1831. He served as member of the lower house of the Mass. legislature 1834-40, and as its speaker 1838-40. He was a member of congress 1840-50, and speaker of the house for the term 1847-49. He entered the U. S. senate, by appointment of the gov., 1850, to succeed Daniel Webster, when the latter became sec. of state, but was defeated for re-election, 1851, by a coalition of free-soilers and democrats. Defeated the same year as candidate for gov., he declined further political service, except as he gave the support of his voice in presidential elections, to Scott 1852, to Fillmore 1856, to Bell 1860, and to McClellan 1864. His principal work after his political retirement was his Addresses and Speeches, made on special historical and commemorative occasions, and published in four vols. (1852-86). He also published *Life and Letters of John Winthrop* (2 vols. 1864), and *Washington, Bowdoin, and Franklin.* He was the trusted adviser of George Peabody, and was president of the trust for education at the south created by Peabody. He gave important service for 25 years as pres. of the Boston Provident Assoc., and for 30 years filled the post of pres. of the Mass. Hist. Soc. His most notable orations were, 1870, on the landing of the Pilgrims; 1876, the Boston Centennial oration; 1881, the

hundredth anniversary of Yorktown; and 1885, on the completion of the Washington monument.

WINTHROP, Theodore: American soldier and novelist: b. New Haven, Conn., 1828, Sep. 22; d. Big Bethel, Va., 1861, June 10. He was graduated at Yale in 1848; traveled extensively in Central and South America; studied law at Saint Louis; was admitted to the New York bar in 1855, and joined the 7th New York regiment in 1861. The *Atlantic Monthly* from June to September of that year contained sketches by him of early war scenes. He was killed at the head of an assaulting column of Northern troops at Big Bethel. He left completed material for five volumes of novels and essays: *Cecil Dreeme* (1861); *John Brent* (1862); *Edwin Brothertroft* (1862); *The Canoe and Saddle* (1862); *and Life in the Open Air, and Other Papers* (1863). His sister published *Life and Poems of Theodore Winthrop* (1884).

WINTHROP, Maine: town in Kennebec co.; on the Maine Central railroad; 20 m. n.e. of Lewiston and 10 m. w. of Augusta. It has oil-cloth factories, woolen mills, agricultural implement works, a corn cannery, and a grist mill. There are six churches, a high school, and graded elementary schools. It has a state bank. The oil-cloth industry was begun in Maine, in 1845, by C. M. Bailey of Winthrop. Pop. (1910) 2,114.

WINTHROP, Mass.: town in Suffolk co.; on Massachusetts Bay and on the Boston, Revere Beach & Lynn railroad; about 5 m. n.e. of Boston. It is a popular beach resort, and a favorite residential section for Boston. The town was originally a part of Boston, then of Chelsea, and later of North Chelsea. In 1852 it was set off and incorporated. It contains many features of historic interest, chief of which is the Dean Winthrop house, built in 1649. It has also Forts Heath and Banks, the Winthrop Shore Reservation, the Ingalls Park, and the Frost Public Library. Pop. (1890) 2,726; (1900) 6,058; (1910) 10,132.

WIN'TON, Andrew of. See Wyntoun.

WINTUN ('people,' 'Indians'): a group of tribes, which, with the Patwin group from the Copehan linguistic stock of North American Indians. The habitat of the stock is northern California from Mount Shasta, including the headwaters of the Sacramento and the valley of McCloud river; thence s.e. along the Sacramento Valley to the mouth of Chico creek, from which point to its mouth the Sacramento forms the s.e. boundary. On the w. the Coast range intersects the territory of the Copehan stock, the westernmost limit of which extends almost to the s. branch of Trinity river, about lat. 40° 30′ N. From the latitude of Cape Mendocino the Coast range forms the western boundary as far as John's Peak, whence it extends in an irregular line s.e. to San Pablo

Bay. The tribesmen live largely by fishing, although various roots, nuts, berries, farinaceous seeds, and clover blossoms form part of their subsistence. They are fond of the water and are constant bathers in the streams that drain their country. Salmon are caught with spears, in the use of which they were exceedingly expert. Their weapons were formerly bows and arrows, and slings. They were indifferent hunters, but were successful in ensnaring deer in traps of their own construction. The population of the score or more of tribes forming the stock is not known, only the Nomlaki and the Wailaki being officially recognized. These are under the Round Valley Agency and are small in number.

WI'NY. See WINE.

WINZE, n. *wĭnz:* in *mining,* a small shaft sunk from one level to another for the purpose of ventilation or for proving the lode.

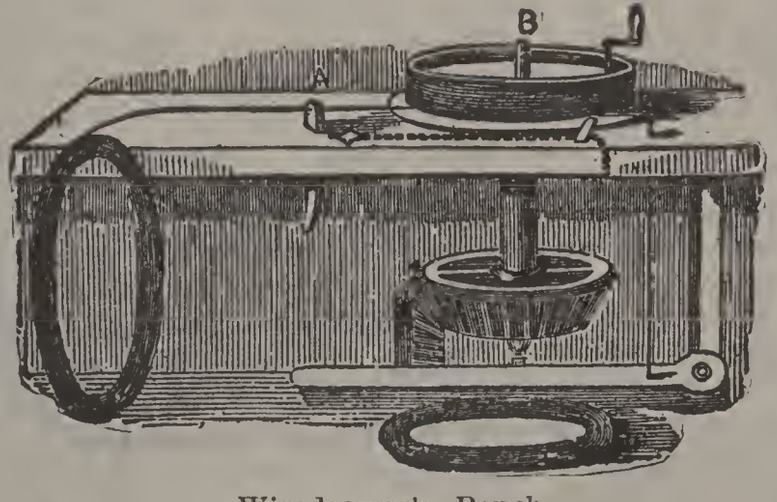
WIPE, v. *wīp* [AS. *wipian,* to wipe: Low Ger. *wiep,* a wisp of straw (see WISP): to clean or dry by rubbing with something soft; to remove by rubbing with or on something; hence, to cleanse from abuses, or from a stain of foulness; with *off* or *out,* to efface; to clear away: N. the act of rubbing or brushing a surface gently for the purpose of cleaning or drying; in *slang,* a blow; a stroke; a crushing repartee; a handkerchief. WI'PING, imp. WIPED, pp. *wīpt.* WIPER, n. *wī'per,* one who or that which wipes, a projecting piece on a horizontal axle, intended to act on a similar projecting part, called the *toe,* of a stamping or pounding mill, which it raises and then lets fall. TO WIPE OUT, TO WIPE AWAY, to efface; to obliterate.

WIPE, n. *wīp* [Sw. *wipa*]: in *OE.* and *prov. Eng.,* the green plover or lapwing.

WIRE, n. *wīr* [Icel. *virr;* Dan. *vire;* Low. Ger. *wire,* wire: Sw. *wira,* to twist: Dan. *virre,* to whirl, to twist]: a piece of metal drawn into a thread; the line of wire by which telephonic or telegraphic messages are sent; hence, *familiarly,* the telegraph, as to send a dispatch by *wire:* V. to bind or supply with wire; to capture by a wire; to send a telegraphic message. WIR'ING, imp. WIRED, pp. *wīrd.* WIRY, a. *wīr'ĭ,* consisting of or resembling wire; tough or sinewy, as a *wiry* frame. WIR'INESS, n. *-ĭ-nĕs,* the state or quality of being wiry. WIRE'DRAW, v. to draw metal into wire by forcibly pulling it through a series of holes gradually decreasing in diameter; to spin out, applied to language or an argument. WIRE-DRAW'ING, n. the act or operation of drawing metal into wire. WIRE'-DRAWER, one engaged in the business of wire-drawing. WIRE-GAUZE, a kind of stiff cloth made of fine wire. WIRE GUN, or WOODBRIDGE GUN, ordnance built up by overlaying a tube with square wire—the interstices filled in with solder or the like. WIRE-PULLING, pulling the wires in

the exhibition of puppets; secret influence and management over others. WIRE-PULLER, one who pulls the wires in the exhibition of puppets, one who powerfully but secretly influences action by others. WIRE-ROPE, a rope formed of strands of wire twisted round some core, usually a hempen cord or rope. Wire-ropes are almost always galvanized or coated with zinc. A hemp rope 6 in. in circumference, and weighing 9 lbs. per fathom; an iron-wire rope 2⅜ inches in circumference, and weighing 5 lbs. per fathom; and a steel-wire rope 1⅞-inch diameter, and weighing 3 lbs. per fathom, all are of equal strength—the breaking strain of each being 10 tons. WIRE-WORKER, a manufacturer of articles from wire.—*Wire* is a metal thread formed by drawing a slip of metal through a hole or graduated services of holes; hence the process of making it is called *wiredrawing*.

The facility with which any metal can be drawn into wire depends on its Ductility. Most metals have this property; but some, like bismuth and antimony, are so brittle that they can be drawn out with difficulty, and wire made from such metals is useless, from lack of tenacity. The metals chiefly used for making wire are iron, brass, copper, silver, platinum, etc., and they all are drawn by essentially the same process. The metal is prepared by cutting up flat rolled plates into rods of a given thickness. This is done by means of a pair of slitting rollers; one of these has grooves, equal to the breadth of



Wiredrawer's Bench.

the rods wanted, fitting into corresponding grooves in the other, which cut the metal like shears. The rods are cleaned of scales of oxide either by mechanical rubbing, or by chemical treatment with dilute sulphuric acid. If the rod is thick, it has its square edge taken off by rollers. It is then forced through the hole of a *draw-plate*. This is an oblong piece of hard steel pierced with conical holes, gradually diminishing in diameter, and having the smallest ends of these tapering holes carefully prepared to the required size. Sometimes cubical-shaped

dies, each with a single trumpet-shaped hole, are used. A wiredrawer's bench is shown in the annexed figure, in which A is the drawing-plate, and B the drawing-block or cylinder. The motion is given by means of bevelled wheels connected with a shaft driven by steam or other power.

The workman begins by making a point on the rod, so as to allow it to pass through the hole, and be grasped by a pair of pincers attached to a chain, which draws it out till the length is sufficient to pass round the cylinder. This much is done by hand, and then the cylinder, being put in gear, is made to revolve and pull the wire through the draw-plate—coiling it round itself as the drawing proceeds. After being once drawn, it is passed through a smaller hole, and so the process is repeated till it has been reduced to the size required. Fine wire may require 20 to 30 drawings. The cylinder revolves slowly with a thick wire, and the speed is increased as the size diminishes. After being passed a few times through the draw-plate the metal becomes brittle, and requires to be annealed. Sometimes a lubricating substance—as wax, grease, or soap—is needed during the drawing, especially for fine wires.

For some very accurate purposes, such as chronometer-springs, and for gold and silver lace, the wire is drawn through jewelled holes, i.e., through holes perforated in ruby or other hard gem. A silver wire 170 m. long, and about $\frac{1}{300}$ of an inch in diameter, has been drawn through a hole in a ruby, and found, by a micrometer, to be of exactly the same size at the end as at the beginning; whereas the drawing of a length of 16 m. of brass wire through a steel draw-plate necessitates a readjustment of the hole.

Platinum wire can be drawn as thin as $\frac{1}{3000}$ of an inch in diameter by first incasing it in silver, drawing down the compound wire, and then dissolving off the silver with nitric acid. By the same process, gold wire $\frac{1}{5000}$ of an inch in diameter can be obtained. It is stated, as illustrating the increase of value in a raw material through labor, that 1 lb. of iron, costing perhaps 4 cents, will yield 50,000 wire pendulum-springs for watches, each weighing about one-seventh of a grain, and selling at the retail price of about 4 cents.

Wire, though mostly cylindrical in form, is drawn of many different sections, such as oval, half-round, flat, triangular, molded, and the grooved pinion-wire from which the small toothed pinions for clocks and watches are cut. Copper wire of different forms is used to form patterns in the blocks used by calico-printers.

The following table (given by Tomlinson) shows the weights sustained by wires of different materials 0.787 of a line in diameter: iron, 549 lbs.; copper, 302 lbs.; platinum, 274 lbs.; silver, 187 lbs.; gold, 151 lbs.; zinc,

110 lbs.; tin, 35 lbs.; lead, 28 lbs. Some kinds of brass wire become extremely brittle in the course of time, especially if subjected to vibration.

WIRE CLOTH: a sieve-like fabric whose woof and weft are of wire; the size of the wire, the shape and sizes of the meshes, being adapted to the use of the completed screen, sifter, or sieve, or the character of the machine in which it is to be used.

WIRE GAUGE: an instrument or mechanism for measuring the thickness of wire and sheet metals. It is usually a plate of steel having a series of apertures around its edge, each corresponding in width to the diameter of wire of a certain number.

WIRE GLASS: an invention used in building construction, being a combination of wire and glass. Wire glass is either ribbed, rough rolled, polished plate or 'maze,' having wire netting imbedded in its centre during the process of manufacture. The temperature at which the wire is imbedded in the molten glass insures cohesion between the metallic netting and the glass, and the two materials become as one, so that if the glass is broken by shock, by intense heat or from other cause it remains practically intact. It combines the strength of the wire netting and the glass plate, and the wire is so thoroughly covered as to obviate the possibility of rust or corrosion. Wire glass will break, but it will not scatter It can be fractured, but it will retain its place, and the perils incident to falling glass and the ingress or egress of draft and flame are avoided. Wire glass appeals to both the practical and the æsthetic in architecture. Practically it supplies the requisite light and ventilation as well as protection against fire, while it admits of a considerable saving in space, weight and cost. Æsthetically it is admissible to all window openings, because it obviates the necessity of cumbersome and unsightly hinged shutters, and the projecting lags and adjusters which support and secure them. Metal sashes fitted with wire glass are rustless, water-proof, durable, sanitary, noiseless in operation and as workable as ordinary window sashes. Wire glass is made in all the varieties known to the rolled glass process, including rough or hammered glass; ribbed glass, figured glass. Wire glass is also polished like plate glass, giving an entirely clear and transparent glass, and is largely used in fire-proof office buildings where there is any external exposure to fire.

The mechanical strength of plate glass is effectively increased by the introduction of the wire mesh, so that it will submit to much greater strains, and in fact one of its first purposes and effects was to eliminate the necessity for using in skylights one-half inch glass, it having been proved that by using one-quarter inch wire glass all the requirements were met, the breakage risk

decreased and a very large factor of weight and expense in structural material eliminated.

WIRELESS TELEGRAPHY. The term wireless, or radio-telegraphy is used in contradistinction to the electric telegraph in which it is necessary to employ a wire as an artificial conducting medium between stations.

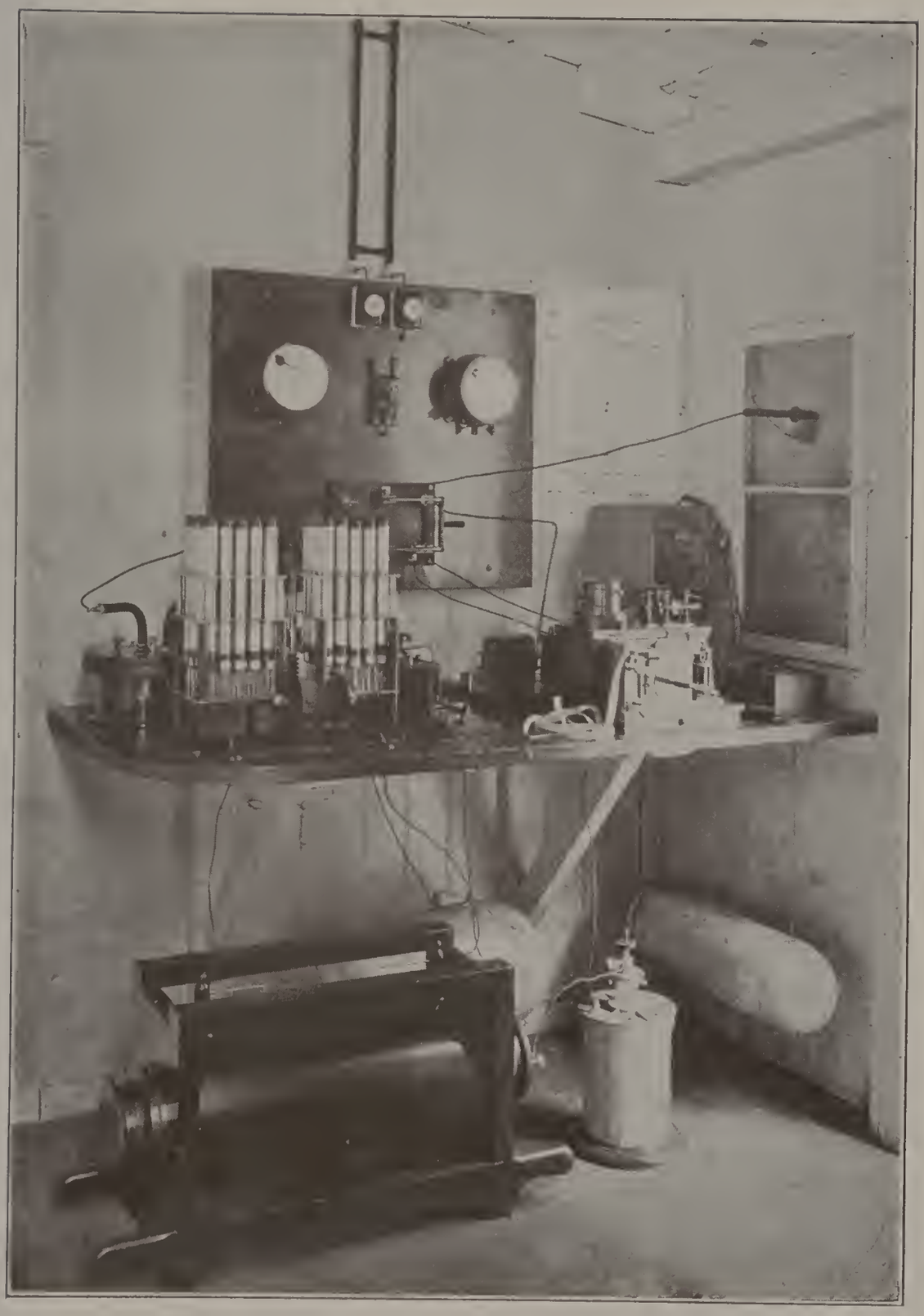
Historical—Attempts to establish communication electrically without the use of wires were made in the beginning of the 19th century. Some inventors worked on the principle of electro-static or electro-magnetic induction. Of these latter types the Phelps and Edison systems were devised with a view of telegraphing to moving trains, while the Preece system was employed to communicate between an island and the mainland, utilizing both of the above principles.

The vertical aerial wire was first employed by Dolbear in 1886 in connection with a peculiar conduction system. Mr. Edison in 1891 proposed to support vertical wires by captive balloons, in connection with an induction telegraph.

The growth of present-day wireless telegraph has been comparatively slow, and the discovery and development of the art can scarcely be placed to the credit of any one mind. In 1864 Clerk-Maxwell demonstrated mathematically the electro-magnetic theory of light, which in effect is that electro-magnetic manifestations are due to undulations of the all-pervading ether.

After the announcement of the electro-magnetic theory of light, which involved the existence of electric waves in free space, many scientists endeavored to demonstrate experimentally the truth of the theory. The honor of this achievement fell to Prof. Heinrich Hertz in 1888.

It had been shown mathematically by Sir William Thompson (now Lord Kelvin) in 1853 that when a Leyden jar or other highly insulated condenser is discharged, the charge is not dissipated in one rush, but gradually, in a series of oscillations, analogously as a pendulum, when pushed from its zero position, will gradually come to rest after a number of oscillations. In 1859 Fedderson demonstrated this experimentally by employing a rapidly revolving mirror. It is well known that in an electric circuit containing coils of wire the current is perceptibly retarded in rising and falling, which fact is due to a property termed self-induction, or inductance, which all conductors possess to a greater or less degree. On the contrary, when a wire possesses electro-static capacity the current is assisted in rising and accelerated in falling. The property of inductance is usually likened to inertia, while capacity is likened to elasticity, in mechanics. Briefly, inductance is that property of a circuit upon which depends the number of self-induced magnetic lines of



The Braun Wireless Station at Heligoland

force that will be set up around or in the circuit when the current in the circuit is varying. Capacity is that property of a circuit upon which depends the amount of charge the conductor will acquire with a given electro-motive force. Electrical resistance may be regarded as molecular friction which the electro-motive force must overcome in forcing the current through the conductor. The shortest electric wave thus far produced is about .15 inch in length. This is still much longer than the longest light-wave, and 60 or 70 times longer than the longest dark heat wave yet measured. In the electric circuits employed in wireless telegraphy the resistance is small (if the spark-gap and detector be eliminated). In fact, if the resistance be too great the discharge will not be oscillatory. The time of an oscillation period is expressed by the formula $T=2\pi\sqrt{KL}$; where T is the time in seconds, π is ratio of circumference to diameter (3.1416), K is capacity in farads, and L the inductance in henrys; resistance R being neglected.

In proceeding with his experiments, Hertz reasoned that, analogously as light-waves affect the eye when they fall upon it, so should electric waves in the ether affect a suitable "eye" or detector when they fall upon it. The apparatus employed by Hertz to show the existence of electric waves in the ether of free space consisted of an electric oscillator for setting up electric waves in the ether, and an electric resonator or "eye" to detect the waves. The circuit in which electric oscillations are set up may be considered to emit electric waves in the ether, virtually as a lighted lamp emits or radiates luminiferous waves in the ether. The Hertz oscillator and detector are shown in Fig. 1. The generator of the oscillations consists of

FIG. 1.
Oscillator and Detector.

an induction coil *I*, the terminals of its secondary wire being connected to small metal balls *b*, *b*, to which short metal cylinders, or wings, *w w* are at-

tached. The balls are separated by a small air space, or spark-gap *s*, across which sparks jump when the coil is in operation. The vibrations of the interrupter "a" set up pulsations of current, due to battery B, in the primary circuit of the induction coil, which pulsations, by magnetic induction, cause alternations of greatly enhanced electro-motive force in the secondary circuit. When the electric pressure rises to a point sufficient to break down the resistance of the air space between the balls *b*, *b*, oscillations surge back and forth in the oscillating circuit *w*, *b*, *s*, *b*, *w*, the rate of which oscillations will vary with the electrical dimensions of the circuit, namely, inductance, capacity, and resistance. The rate at which the interrupter of an induction coil vibrates may vary from 50 or less to hundreds of vibrations per second. The oscillations of the electric oscillator may be many millions per second. It is evident, therefore, that the induction coil, or other alternating current generator, merely serves to strike the blow, so to speak, that sets up the rapid electric oscillations in the oscillating circuit, analogously as when we wish to keep a tuning-fork in vibration we must strike it at intervals. As a detector, Hertz employed a copper wire, *D*, of circular shape, but broken at one point. On the ends of this wire he placed small metal knobs, *d*, the distance between which could be regulated by a micrometer screw. This wire was supported on an insulating stand in a darkened room, and small sparks could be seen passing between the knobs *d* when oscillations were established in the oscillating circuit *w*, *b*, *s*, *b*, *w*. This experiment was held to demonstrate the existence of electric waves in the ether, as predicted by Maxwell.

The distance at which electric waves are detected by the Hertz devices is very limited, perhaps not more than 10 or 12 feet at most. These devices, however, demonstrated the possibility of signaling to a distance by electric waves, and the experiments set other minds at work in this direction. Not long after the announcement of Hertz's experiments, Dr. Branly discovered that metal filings, when thrown together loosely and made part of an electric circuit, have normally a high resistance, but under the influence of electric oscillations they lose this resistance and become good conductors of an electric current.

In 1894 Dr. Oliver Lodge (now Sir Oliver Lodge), in a lecture before the Royal Society, London, showed that the Branly filings coherer could be used to detect signals telegraphically by placing them in a glass tube and making them part of an electric circuit in which was a battery and a telegraph receiver. In this experiment when the induction coil was operated at a distance of some yards from the coherer the latter was actuated. In order that the filings should not

remain cohered after the oscillations had ceased, he caused the hammer of a bell operated by clock-work to strike or tap the glass tube as long as the electric oscillations continued. An electric bell has generally been employed in the later use of the filings coherer. In 1895-96 Popoff and others utilized the filings coherer as a means of detecting atmospheric electricity, employing for this purpose a vertical wire extending many feet into the air, the coherer being placed between the lower end of the vertical wire and the earth.

In 1896 Marconi connected a vertical wire to one side of a Hertz oscillator and grounded the opposite side making it the physical counterpart of the Popoff receiver, thus producing the first complete set of wireless apparatus utilizing electro-magnetic waves as a conducting medium. Following Marconi's discoveries many inventors entered the field and keen competition has produced wonderful results in the development and perfection of apparatus, so that to-day wireless has taken its place, with marvels of the past, in the service of man.

Theories of Electric Wave Propagation.—It is well known that substances opaque to light obstruct the passage of the luminiferous ether waves. Analogously, it was thought, in the early days of wireless telegraphy, that the curvature of the earth or sea between points several hundred miles apart would prove a barrier to electric waves traveling, like light waves, in straight lines, inasmuch as it would not be practicable to obtain masts, or other means of support for vertical wires, of sufficient height to overlook the barrier. Later experiments, however, showed that with wires only 200 feet high signals could be transmitted to points between which there was a wall of earth or water 15 or 20 miles in height, due to the curvature of the earth.

It is now an accepted fact that the oscillations set up in a wireless system cause a grounded electro-magnetic wave, which carries the signal to the great distances now obtained, as well as emitting free ether (Hertzian) waves which die out in a comparatively short distance. A number of theories have been advanced in explanation of this phenomena. For example, that the waves are propagated around the earth by diffraction, or reflection, but these theories are not generally held to be tenable. A theory that meets with favor at present is that the electric waves are propagated as sliding waves over the surface of the earth or sea.

Before referring further to this theory, brief allusion may be made to the supposed action that takes place in and around the Hertz oscillator in the production of free electric waves in the ether. The Hertz oscillator corresponds to a condenser with widely sepa-

rated plates. In the act of electrically charging the arms or rods of the oscillator, lines of force or strain spring out all around the rods in the dielectric, that is, the air surrounding the rods. To fix ideas, these lines of force may be likened to highly elastic half hoops, partially flattened out, and with their ends resting on the rods. One end of the lines of force is assumed to be positive, the other negative. These hoops or lines resist straightening out and their resistance to the strain increases the further they are straightened out, until their back pressure equals the charging force. According to Maxwell's theory of displacement currents in dielectrics, during the process of applying this strain a displacement current flows in the circuit, and when the counter pressure of the lines equals that of the charging force the displacement current ceases to flow. At this time the rods of the oscillating circuit have acquired the potential of the charging electro-motive force. When the external electromotive force reaches a point where it breaks down the resistance of the air gap, the energy stored in the dielectric is returned to the circuit and a current flows across the gap and the strain in the dielectric is thereby relieved, concurrently (Poynting) with which the ends of the lines of strain contract, one end sliding down the rod, the other gliding up the rod, toward the air gap. The extreme outside portion of the lines also tend to contract, but as such portions of the lines move more slowly than the ends, the latter meet, and as they cannot pass one another, the lines are snapped or whipped off, perhaps like rings of smoke from the smokestack of a locomotive, forming closed electric lines of force which are radiated into space. Coincidentally also with, and as a result of, the collapse of the electric lines of force, magnetic lines of force are set up concentric with the Hertz rods and at right angles to the electric lines of force. When the magnetic lines of force reach their maximum the electric lines of strain will have vanished. Immediately, however, the magnetic lines of force now begin to collapse and are detached, their collapse setting up new electric lines of strain. These processes are repeated until the oscillations cease, to be renewed when the rods are again charged and the spark gap again breaks down. The detached lines of force thus jointly constitute electric radiation, or free electric waves which are propagated as ever-expanding electro-magnetic waves in free space. Any portion of these waves on reaching a receiving vertical wire excite therein the electric oscillations which affect the coherer or other detector.

One theory is that the grounded vertical wire may be considered to be equal to one-half of a Hertz oscillator (Fig. 1). The other half being the ground it-

self. On this assumption the earth is a perfect conductor—therefore a reflector of high frequency electric waves—and the vertical wire may be supposed to have a reflected counterpart below it, virtually like the image seen under a pencil standing vertically on the surface of a mirror lying horizontally on a table. This is in accordance with what is termed the image theory, advanced by Delaricci and Blondel. The electric oscillations in such a system may then correspond to those in the Hertz oscillator, a complete oscillation consisting in a wave from the spark-gap to the top of the antenna back to the spark-gap, thence to the foot of the reflected, or imaginary wire, and back to the spark-gap, which constitutes a wave length four times that of the vertical wire proper. The wave length, $\lambda \frac{A}{N}$, where V is velocity (186,000 miles per second) and N is number of waves per second. As the period of an oscillation or wave is $T = 2\pi \sqrt{KL}$, it is clear that the wave length of the vertical wire or other conducting circuit may be increased by adding to it capacity or inductance.

On the sliding wave theory the grounded vertical wire is assumed to be the equivalent of a Hertz dumbbell oscillator divided in the middle by a reflecting conducting surface, the earth. Hence such a wire will have a real oscillating system above the earth and an imaginary one below the conducting surface. The oscillations occurring in this system may then correspond to those in the Hertz oscillator. Thus it is assumed that when the vertical wire is charged, electric lines of force are set up in the dielectric, one end of which lines rests on the ground, the other on the vertical wire. When the discharge occurs the upper ends of the lines glide down the wire to the earth and are pushed away by succeeding lines of force, the detached waves traveling out radially in the shape of large concentric circles, not into space, but sliding over the surface of the ground, traveling over or around the convex surface of the earth, sea and hills, or following the contour of valleys. According to Taylor, who has elaborated this theory, the intensity of the waves should not vary much less than inversely as the distance. According to Blondel and Fessenden the intensity diminishes inversely as the square of the distance. Kennedy (London *Electrical Review*, Vol. L) says, "The effects are not due to etheral waves traveling as light does, but to electric oscillations set up in the earth itself considered as a whole sphere. . . ." To make this theory tenable we must admit the use of stationary wave which condition does not coincide with practice. However, the author believes under certain conditions stationary waves are formed which accounts

for the long distance records that are unexpectedly obtained when it is impossible to communicate over much shorter distances. (Consult Tesla's work on stationary waves.) The theory advanced by Lecher is that electric waves are transmitted along the earth's crust as waves are along wires. That wireless signals are a wave motion in, or disturbance of, the electromagnetic forces of the earth and follow the curvature of the earth, is the theory advanced by Massie. The waves are formed and propagated the same as when a stone is thrown in a pond of water. Results brought out in practice seem to confirm these latter theories.

Marconi's Early Experiments Describing First Principles of Wireless and Apparatus Used.—In his experiments, Marconi employed an induction coil, a Morse telegraph key, batteries and vertical wire, for the transmission of signals, and for the reception of signals, a filings coherer, a telegraph relay, batteries and vertical wire. The general arrangement of Marconi's simplest apparatus is outlined in Figs. 2 and 3. In Fig. 2, *i* is the induction coil, *a* is its interrupter, *p* is the primary wire, *s* is the secondary wire of induction coil, *b* is a storage battery of about 5 cells. K is the Morse key; *b*, *b*, are the spark balls. The vertical wire *A* at its lower end is connected to ball *b*; the other ball *b*, is connected with a wire leading to the earth. Balls *b* *b*, of the oscillator are thus in series with the vertical wire. The terminals *w* *w*, of the secondary wire are also connected respectively to *b* and *b*. The receiving apparatus is outlined in Fig.

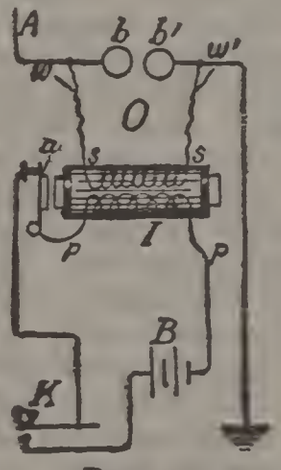


FIG. 2.

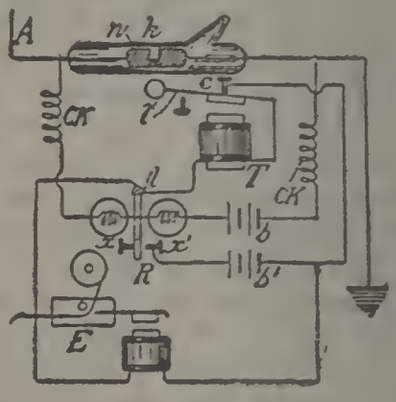


FIG. 3.

Marconi Earlier Apparatus

3. The Marconi filings coherer as it appears in practice is shown at *k*. It consists of a glass tube, suitably upheld, about 1.57 inches long and .1 inch inside diameter. The filings, a mixture of 90 per cent. nickel and 10 per cent. silver filings, are inserted in a small space between two plugs *n*, which fit snugly into the tube which is exhausted of air. Small wires ex-

tend from these plugs to the outside of the tube. One of these wires is connected with the vertical wire *A*, the other with a wire leading to the earth. Hence the coherer is in series with the vertical wire. The relay *R* is in a shunt circuit with a single cell of battery *b* and the coherer, as shown. The armature lever *l* of this relay controls the local circuits of the electric bell *T* and an ink recording register E, which are operated by local battery *b* of four or six cells.

The actual transmission of messages is effected by means of key *K*, Fig. 2. Each time the key is closed the vibrator "a" starts into operation with the result that electric oscillations are set up in the vertical wire and a train of electric waves is radiated therefrom in the ether. Thus by opening and closing the key for a shorter or longer time the train of waves is broken up into signals corresponding to dots and dashes which are received as such at the receiving station. The operation at the receiving station is practically as follows: Normally the armature lever *l'* of the tapper *T* is given a tension which holds it against the contact *c*. Normally, also, the armature lever *l* of relay *R* is on its back stop *X*. Hence at this time the local circuit of battery *b'* is open. When then the electric waves set up by the oscillator arrive and electric oscillations are thereby excited in the vertical wire at the receiving station, the resistance of the coherer drops sufficiently to allow the battery *b* to energize the relay "*R*" and its lever *l* moves over to contact *X'*, closing thereby the circuit of battery *b'*, whereupon the electro-magnet of tapper *T* attracts its armature *l'*, which act opens its own circuit at contact point *c*. At once the armature of *T* flies back on its contact point, at the same time striking the tube, decohering the filings and demagnetizing relay *R*, whose armature lever returns to its back stop *X*. Immediately, however, the filings again cohere (assuming that the oscillations continue), with the result that *R* is again magnetized, the actions just described being repeated many times in a second. Hence, while the oscillations are being received the tapper keeps up a buzz or hum, which stops when the oscillations cease. Likewise, while the oscillations continue in the receiving vertical wire the inking register *E* is actuated and dots and dashes are imprinted on the paper strip. The paper strip is started and stopped automatically, by devices well known in telegraphy, when signals commence and when they cease.

The Vertical Wire.—Marconi's first experiments in wireless telegraphy were made with a vertical wire twenty feet high at the sending and receiving stations. With this height of wire he transmitted signals one mile. With wires 40 feet high, signals were transmitted four miles and with wires 80 feet high 16 miles.

This clearly shows it is not necessary to have direct connection to the earth. A ground for a shore station is generally made of a number of plates thrown into the water with a heavy copper wire leading from same to the station. In Alaska and similar cold regions where the ground is frozen the year round, thus making it a poor conductor, a ground is obtained by spreading a net work of wires over a large surface of the earth. In some cases this net work is supported and insulated from the ground. This is done to conform with a theory, but is of no practical advantage. A common way of testing the efficiency of a wireless ground is to hold the finger in close proximity to the ground wire just below its connection to the apparatus. A discharge will take place between the finger and the wire and the length of same is in proportion to the efficiency of the ground. From a good ground you cannot draw more than 1-32″ spark.

The ground for a station built on sand was obtained by driving numerous brass rods through the dry sand to the moist soil within a radius of 100 feet around the stations and copper wires radiating to and connecting all the brass pipes.

Coherers, Auto-Coherers, Detectors.—The Castelli auto-coherer is outlined in Fig. 4. It consists of a glass tube *K*, 1.7 inches in length, a carbon rod *c*, a plug of iron *i* within the tube, and a small drop of mercury *m*, placed between *c* and *i*. The rod *c* and plug *i* are adjustable within the tube by the screws *h*, *h*. *A* is the vertical wire which is made a part of the coherer circuit. A telephone receiver *t* and a small battery *b* are placed in a shunt circuit around the coherer.

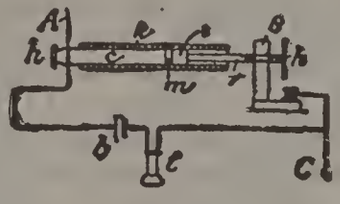


FIG. 4.
Castelli Auto-coherer.

Normally, the imperfect contact between the mercury and the carbon causes a high resistance in the coherer, but when electric oscillations occur in the circuit the mercury and the carbon cohere and the resistance falls. The consequent variations of current in the shunt circuit produce sounds in the telephone receiver of long and short duration corresponding to the dashes and dots transmitted. This auto-coherer is used extensively in the Italian navy and was used by Marconi in some of his trans-Atlantic experiments. Shoemaker devised an auto-coherer by bridging steel razor edges with pieces of carbon lamp filament. Massie perfected

one having a steel needle resting on carbon edges. This was designed for shipboard use; to overcome the motion of the boat the needle was caused to rest against two magnetized steel pins inserted between the carbon edges.

An auto-detector devised by Marconi is based upon the fact that electric oscillations hasten magnetic changes in iron, or, in other words, reduce the hysteresis (that property of iron and steel which retards changes of magnetism). To avail of this observed fact Marconi provides an endless iron rope or core of thin wires about 12 inches long, which revolves on pulleys operated by clock-work. The core is caused to pass through a spool on which are wound two coils of fine wire. The inner coil of wire is connected in series with the vertical wire, the outer coil is made part of a circuit in which is included a telephone receiver, but no battery. In proximity to these coils are placed two horseshoe magnets having their similar poles adjacent. The changes of magnetization in the iron core as it passes through the coils in proximity to the horseshoe magnets are not sufficiently rapid

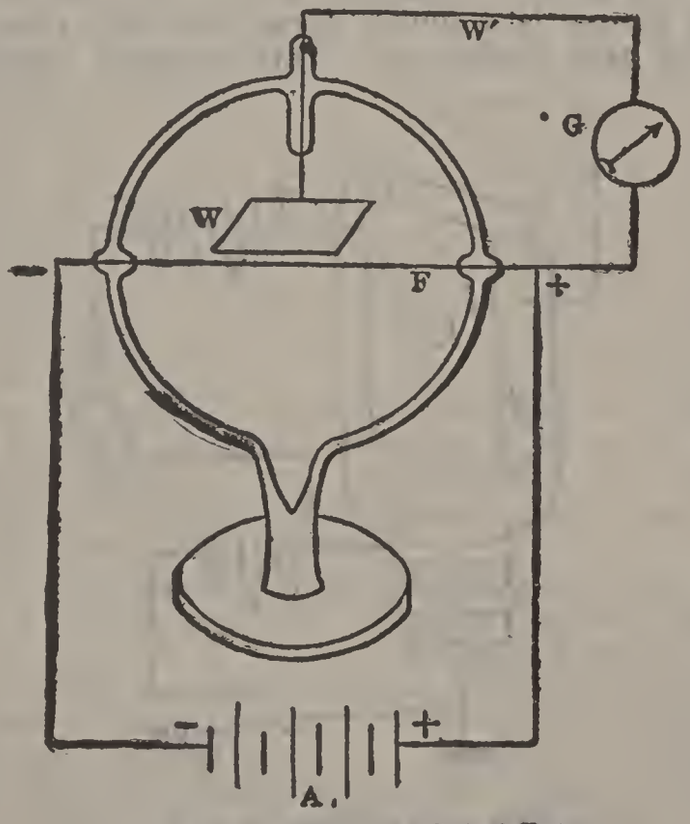


FIG. 4a.— Elston and Geitel Tube.

to set up currents in the coils, but when electric oscillations pass in the inner coil, rapid momentary changes in the magnetization of the core take place and the consequent rapid variation of the magnetic lines of force of the core set up momentary currents in the coil which are heard as sounds in the telephone receiver.

General Dunwoody, of Washington, D. C., perfected a detector consisting of a small crystal of carborundum clamped at its edges between two metal electrodes or terminals. It is placed in circuit with a small battery and a telephone receiver. Its operation appears to depend on the development of heat, due to the local battery, at the minute points of contact which heat reduces the resistance of the carborundum. Incoming oscillations affect this resistance and thus produce sounds in the telephone. The sensitiveness of this detector is somewhat greater than the filings coherer. It possesses the advantage for shipboard use that jarring does not disturb its operation.

The DeForest receiver, termed by him the "Audion" is based upon the Elston and Geitel exhausted tube arrangement, shown in Fig. 4a, for demonstrating the ionization of air by means of a fine metallic filament *F*, brought to a desired degree of heat by a battery *A*. An insulated platinum plate *W* in proximity to the wire *F* is connected by a wire *W'* to the circuit of a galvanometer *G*. At red heats and at atmospheric pressure a positive charge of a few volts due to ionization of the air is produced upon plate *W*. (See RADIO-ACTIVITY and ELECTRONS). This potential increases as

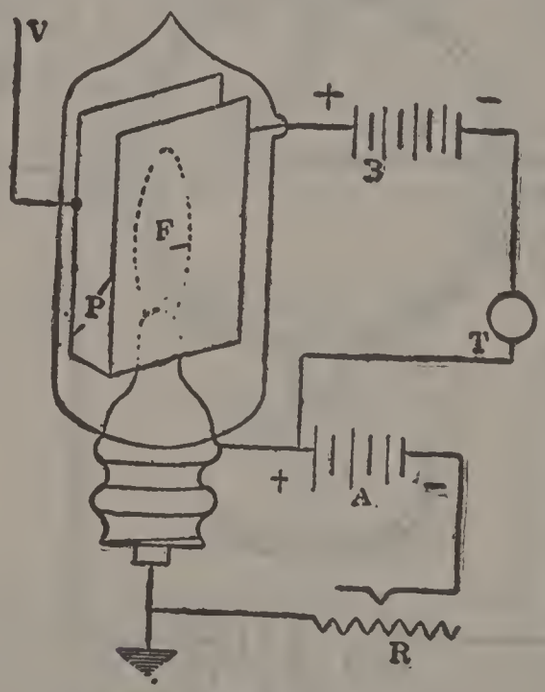


FIG. 4b.—DeForest Audion.

the temperature of the wire rises to a yellow heat. As the wire gets hotter the potential decreases, until at a bright white heat the potential of the plate is very slight. To this arrangement DeForest adds a flux battery *B* and a telephone receiver *T*. (Fig. 4b). F is a filament which is heated by the current from battery *A*, the strength of which is regulated by an ad-

justable resistance *R*. The filament is placed between two perforated metal plates *P*, to which the vertical wire *V* of the wireless system is attached. The lower end of the filament is connected by a wire to the earth. The addition of the flux battery appears to augment the Hertzian energy to a marked extent, and hence comparatively loud sounds corresponding to dots and dashes are set up in the telephone receiver by incoming oscillations. The sensitiveness of this detector increases with increase of temperature, and in attempting to reach the maximum point the filament is often destroyed. This fault, together with the necessity of storage battery, makes this device impracticable.

The principle employed in the Silicon receiver invented by G. W. Pickard is that of thermo-electric couple. (See ELECTRICITY, THERMO.) The electrodes, or thermo-electric couple, employed by Mr. Pickard in this receiver are pure silicon and a metallic element of low resistance under a certain pressure. This couple is placed in the receiving oscillation circuit in which is also placed a telephone receiver, but no battery. According to the inventor the received oscillations are converted into heat at the thermo-electric couple, the amount of heat developed being in accordance with the C^2R law, the energy of which is converted into direct electric currents which are heard in the telephone receiver as sounds. Tests by Pickard of a number of the best known electric wave detectors show the amount of energy required to give a just audible dot (or sound) in the telephone receiver to be as follows: Electrolytic detector, .000364 to .000400 Erg.; Magnetic detector, .000400 to .000410 Erg.; Silicon detector, .000430 to .000450 Erg.; Carborundum detector, .009000 to .014000 Erg. The fact that no battery is required (although a slight battery current greatly improves it) and parts do not deteriorate makes this a very practicable device. Pickard has also made several other detectors using different metals but all involve the same principle.

To Prof. Reginal A. Fessenden must be given the credit of inventing the most sensitive detector known to-day. It consists of a small insulating vessel containing a dilute solution of nitric acid, into which is inserted for a short distance (.005 inch) a very fine platinum wire (about .00004 inch diameter). Another platinum wire, not necessarily so fine, enters the acid from the bottom of the vessel, and the detector as a whole, termed a liquid barretter, is connected between the vertical wire and ground, for receiving, as shown in the figure. According to Fessenden's view all the resistance in the conducting medium is concentrated within a short distance of the point where the fine platinum wire enters the acid, and hence all the temperature effects are local, or take place inside of a

hemisphere of exceedingly small radius. The heating effect of the small battery "*b*", Fig. 18, normally increases the resistance of the shunt circuit, which resistance is broken down by the incoming electric oscillations, and the variations of current strength due thereto are recognized in the telephone receiver as dots and dashes. The action of this detector, therefore, according to Fessenden, is thermic, not electrolytic. The current from the battery *b* is initially low, the battery being composed of two cells in opposition, one of the cells being of slightly higher electro-motive force than the other. The current flow is further regulated by the resistance or potentiometer *r*.

Condensers.—The condenser is the source of most of the trouble and expense in running a wireless station. It is caused by blistering or tearing of the tinfoil on the jars or puncturing the glass by the heavy charges. To overcome the blistering jars are now given a coat of metal paint and fired. If a heavy coating is required the jar is then electroplated with copper or silver. In most cases puncturing is caused by heating at contact points between metal coating and conductor or an internal stress in the glass caused by unequal heating of interior and exterior surfaces. This latter is due to unequal ventilation. To overcome this trouble, Massie uses flat glass plates set on edge; contacts are made by permanently attaching conductors to the metal coating. Glass plates are now extensively used in various systems. Marconi used plates immersed in oil at some of his high-power stations. Fessenden has probably perfected the most satisfactory condenser. In place of glass or oil Fessenden uses compressed air as a dielectric. The condenser is formed of several circular metal plates uniformly spaced, one within the other, and the unit thus formed is placed in an air tight metal tank. The old form, Leyden jar, is used in the DeForest and Shoemaker systems. The Telefunken Company use a special form of jar; this is the result of a theory that the tinfoil edge forms a "leak" and thus lowers the efficiency; however, practice does not show any appreciable improvement of this jar over the other types.

Spark-Gap.—The first spark gaps used in wireless were made of metal rods terminating in spherical pieces of brass. As the art developed and the power increased it was found necessary to in some way ventilate the gap. The first improvement was made by DeForest who placed an ordinary air blower in such a position that the fresh air was blown across the gap. Massie next perfected a cooling system utilizing compressed air. The compressed air was piped to needle control valves at the external ends of the spark rods which were made hollow. Fessenden devised a "synchronous" spark gap by placing a large insulated metal

rim on the shaft of the alternator. This formed one terminal of the gap the other being a stationary rod. In the metal rims were metal points so placed that one would be opposite the stationary rod at the instant the charging current reached a maximum. Massie has recently devised a rotary spark gap of high efficiency; by its use radiation is increased over 25 per cent. A metal rimmed wheel revolved by a motor is mounted between two stationary rods. The rim is hollow, on the sides are scoops which collect the air and carry it into the chamber; it escapes from there through holes in the face of the wheel. The whole device except motor is mounted in a muffler or box and a fan placed on the shaft where it enters the box; this forces a continuous supply of fresh air into the box. The heated air escapes through an opening at one end of the box. Marconi, in his high power stations, forms the gap between two large metal rims revolved by motors.

Generators of Electric Oscillations.—The need of greater radiating power in long distance wireless transmission than is obtainable from the ordinary induction coil, as well as the unreliability of the interrupters of such coils, when used with large currents, which soon wear off the contact points, has led to the adoption of special forms of induction coils and transformers. Instead of battery power also, alternating current generators are employed as the source of electro-motive force. The power of the generators may vary from 1 kilowatt to 100 or more kilowatts. The rate of alternations of the transformer depends on the frequency of the generator. In practice the frequency of the generator is either 60, 120 or 240 cycles per second. Apparatus designed to operate on 480 cycles is now used to great extent and is far more efficient in many ways. The high note produced can be more easily read through interference caused by atmospheric electricity; this practically solves the problem of tropical wireless. The electro-motive force in the primary circuit of the transformer may be from 50 to 500 volts, which is greatly increased at the secondary terminals of the transformer; in some cases to 20,000 or 50,000 volts. Latest developments show that a secondary voltage of 10,000 or 12,000 is the most efficient.

Synchrony or Tuning.—Technically defined, the word tuning means that the inductance, capacity, and resistance of the open and closed circuits of a transmitter or of a receptor are so proportioned that the frequency of the oscillations set up in them will correspond exactly to these electrical dimensions, while syntonizing means the tuning of the transmitter and of the receptor to equivalent periods of oscillation, or in other words, to each other. In the everyday practice of wireless the word tuning is almost universally em-

ployed in the individual as well as the collective cases. However, when the transmitter or receptor circuits are tuned so that simple resonance is obtained each instrument will be in itself much more efficient, but this is not enough to produce the best results in a wireless system for both instruments must be carefully tuned so that they will be in syntonic resonance as previously cited. This is done by taking advantage of the fact that the rate of oscillations, or the frequency of an electric circuit is proportional, as already noted, to the inductance, capacity and resistance of the circuit.

Tuning also possesses the advantage that the benefits of resonance may be obtained by its use, as follows: It is known that a vertical wire grounded directly at its lower end is an excellent radiator of electric waves, but as it possesses very little capacity its oscillations are quickly damped, as indicated in Fig. 5, and it is

FIG. 5.
Quickly damped Radiator.

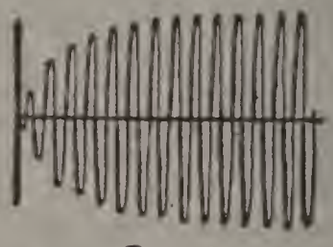


FIG. 6.
Persistent Radiator.

only the first few oscillations that are of sufficient strength to effect a receiver. When capacity and inductance are added to a circuit in proper proportions it may be made a persistent vibrator (Fig. 6), and consequently a given amount of electrical energy expended at the transmitter in producing a succession of waves of more uniform amplitude will have a cumulative or resonant effect upon a receiving circuit of equal capacity and inductance, and will eventually cause it to respond to the waves emitted by the transmitter; while an untuned receiving circuit containing a detector, equally as sensitive as the first one, would probably not respond to those particular oscillations. In tuned circuits it is essential that the makes and breaks or alternations of the primary circuit of the transmitter should follow each other rapidly in order that the full effects of resonance may be obtained. Obviously with a given amount of electrical energy tuned circuits increase the distance to which signals may be transmitted.

As a rule the spark-gap and the receiving apparatus of untuned circuits are connected directly to earth as indicated in Fig. 7, in which *A* is the antenna; *b b* are the spark balls; *s* is the spark-gap; *S* is the secondary and *P* is the primary of an induction coil. In such an oscillating circuit (*A*, *b*, *b*,), the oscillations are

quickly damped. In the case of tuned circuits, or where, at least, the effects of resonance are desired, there is provided a closed oscillating circuit which is

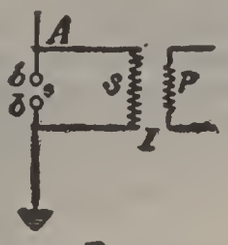


FIG. 7.
Open Circuit.

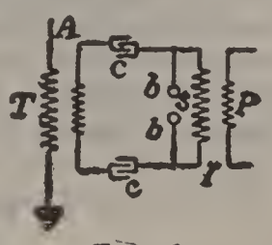


FIG. 8.
Closed Circuit.

separated from the vertical wire by a transformer. Such an arrangement is outlined in Fig. 8. The closed circuit in this case consists of the spark-gap, condensers "cc", and the primary of transformer *T*. In most of the systems of to-day the transformer, *T*, is replaced by an auto-transformer as it has a greater flexibility. In practice this method is called tight coupling and the transformer is referred to as a loose coupling.

In addition to the fact that the oscillations in an ordinary vertical wire are quickly damped, it should be considered that the oscillations set up by a spark-gap transmitter are not continuous in the strict meaning of the word, since there is a perceptible time, while the oscillation circuit is being charged to the breaking down point of the air-gap, during which the oscillations tend to die out. Several inventors have striven to obtain a transmitter capable of supplying undamped or practically uniform oscillations to the oscillation circuit. Poulsen, the inventor of the telegraphone, has developed some improvements in this direction by a modification of the Duddell singing arc. The Duddell singing arc is described in his British patent No. 21,629. Briefly, it consists of an arrangement in which an arc lamp supplied by a direct current is placed in parallel with a capacity and an inductance. When this capacity and inductance are suitably chosen, rapidly alternating currents are set up in this arc which produce a tone—hence the name singing arc. In Poulsen's modification of this arrangement the negative electrode of the arc is carbon, while the positive electrode is copper, the arc being enclosed in a box containing hydrogen gas. The arc is shunted by a capacity and inductance, and rapidly alternating currents are continuously set up which are thrown on to the vertical wire in the usual way. With Duddell's arrangement the frequency of oscillation was about 30,000 to 40,000 periods per second—too low for utilization in wireless telegraphy. A much higher frequency is obtained by the Poulsen arrangement which is attributable to the atmosphere of hydrogen.

To further the cooling of the electrodes (an essential first noted by Elihu Thomson, vide U. S. Patent No. 500,630), the copper electrode is made in the shape of a hollow ring through which water is passed.

Wave Meters.—Several electric wave meters have been devised for the purpose of measuring the wave lengths of electric oscillations, for wireless telegraph purposes. One of these, known as the Donitz electric

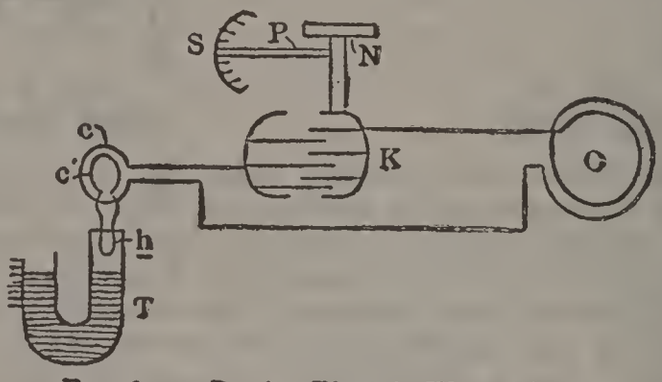


FIG. 8a.— Donitz Electric Wave Meter.

wave meter, is outlined in Fig. 8a. It consists of a coil of wire "C" about 10 inches in diameter that may be placed in the field of force of the oscillating circuit to be measured. This coil is in circuit with an adjustable condenser (capacity) *K* and another coil of wire. This later coil is the primary of a small induction coil, the secondary wire *c* of which is prolonged into the top of a U-shaped glass tube *T*, when it acts as a "heat" wire *h*. The glass tube is partly filled with a colored liquid. The condenser *K* consists of two series of semi-circular plates, one of which series is fixed, the other series is movable to or from the fixed series. The movable plates are operated by a knob *N*, on the cover of the box containing the plates. A pointer, *P*, attached to the knob moves around a graduated scale, *S*, on the cover. This scale is calibrated to indicate the wave length, or frequency of the oscillations, which factors are deducible from the known inductance of coils, *C c*, and the condenser *K* in the various positions of its plates. The coil being held in the field of a nearby oscillating circuit the knob of condenser *K* is moved until its circuit is in tune with the external oscillating circuit which will be indicated when the heat wire *h*, by expanding the gas in upper end of the tube, displaces the liquid to a maximum height. At this time the pointer will be opposite a point on the graduated scale on the cover, which either directly or by the use of a prepared curve will indicate the frequency or wave length of the oscillating circuit under measurement; inasmuch as it is known when two oscillating circuits are in tune the product of their respective capacity and inductance will be equal. Fleming perfected a wave meter, or cymometer, as he called it,

which consisted of a closed oscillating circuit. The condenser is made of brass tubes one within the other, insulated with hard rubber. Adjustment is made by simultaneously varying capacity and inductance. By this arrangement wave lengths are indicated direct by a pointer attached to the moving member. The resonant point is ascertained by the employment of a vacuum tube of the spectroscopic type containing rarified Neon, which is connected to the plates of the condenser.

Marconi Tuned Wireless Telegraph System.—One arrangement of Marconi's tuned or syntonic transmitting and receiving circuits is shown theoretically in Figs. 9, 10. Fig. 9 represents the transmitting apparatus and circuits. In this *A* is the vertical wire in which is inserted an inductance coil *w*, the number of turns of which, in use, may be varied by a sliding contact *x*. By this means the period of the vertical wire may be adjusted to correspond with that of the closed oscillating circuit *p*, *c*, *b*, *b*. The condenser *c*, usually Leyden jars, of about .25 micro-farad capacity, may also be adjustable. *I* is an induction coil. *K* is a Morse key and *B* is a storage battery of five or six cells. The receiving apparatus and circuits are illustrated in Fig. 10. As in Fig. 9 *A* is the vertical wire, attached at its lower end to an inductance coil *w*. The coils *p* and *s s* constitute what is termed a "jigger" or hoister; it is in fact a type of "step up" transformer and is used to increase the efficiency of the apparatus by enhancing the electro-motive forces acting upon the coherer; availing of the fact that there is a "node" of electro-motive force and a "loop" of current at the foot of the vertical wire,—that is, at that point the electro-static energy is at minimum while electro-magnetic energy is at maximum. (See remarks on Slaby-Arco system relative to electric pressure at top of vertical wire). *K* is the Marconi filings coherer, which is in series with the secondary coil *s s* of the jigger. A small

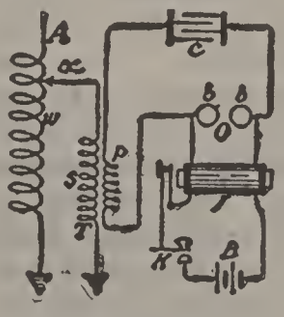


FIG. 9.

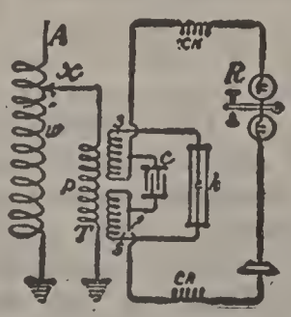


FIG. 10.

Marconi Tuned System.

condenser *c* is connected as shown, this forming a short path for the oscillatory currents via the coherer, inasmuch as for momentary currents the condenser is

practically a conductor. *ck ck* are small choke coils (really inductance coils), which direct the oscillatory currents across condenser *c*, thereby preventing any diversion of these currents through the relay *R*. This is a polarized relay of from 1,200 to 10,000 ohms resistance, in the circuit of which is a single cell *b*. The relay is usually inclosed in a cylindrical case to exclude dust. Some of the relays used for this work will respond to a current of $\frac{1}{20,000}$ of an ampere. In practice this relay, the jigger, the coherer and tapper are inclosed in a metal sheathed box to prevent the action of external electric waves upon the coherer. For the same reason the local contacts of the relay and tapper are shunted with resistances, not shown in the figure. The Morse key employed is massive, with front and back contacts which are insulated from one another. It is provided with a large vertical ebonite handle to protect the operator against shocks.

The Fleming Long Distance Transmitting Circuit.—In Fig. 11 is shown diagrammatically an arrangement,

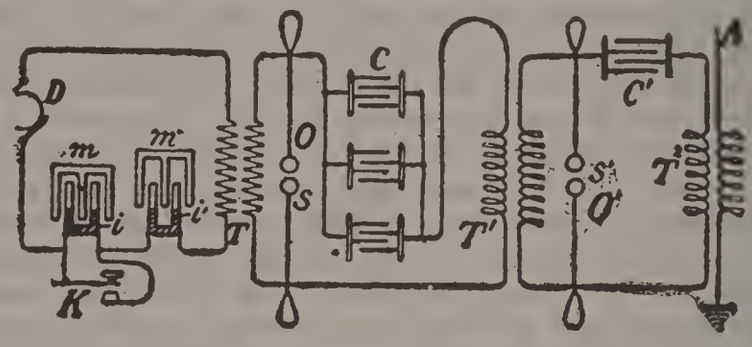


FIG. 11.
Fleming's Transmitting Circuits.

designed by Professor J. A. Fleming for the Marconi Wireless Telegraph Company, to be used in long distance transmission. In the figure D is a 500 or 1,000 volt alternating current generator of 10 or 20 kilowatts capacity, and having a frequency of about 50 per second. *T*, *T* and *T* are transformers. The primary circuit of T is in series with the generator *D*, and the coils, *i*, *i*. The transformer *T* raises the electro-motive force to about 20,000 volts, charging the condensers *C*, which discharge across spark-gap "S", setting up oscillations of a high order in the oscillating circuit *O*, *S*, *C*, *T'*. These oscillations are again transformed to higher voltage in the secondary of *T'*, which in turn charges condenser *C'*, and this, in discharging in the oscillating circuit *O'*. *S'*, *C'*, T^2, still further increases the electro-motive force thrown upon the vertical wire or wires A. The estimated electro-motive force obtained at the vertical wire in this way is about 100,000 volts. These condensers and transformers are of special con-

struction to withstand these high pressures and to give the desired capacity and inductance. To avoid directly opening and closing the primary circuit of the transformer T, the two choke coils, *i*, *i'*, having movable iron cores *m*, *m'*, are placed in that circuit. The iron core *m'* of *i'* is so adjusted that as much current as may safely be passed through the primary of T shall normally flow in the circuit. The core *m* of *i* is inserted to its full length in the coil, and its inductance is sufficient to stop all flow of alternating current in the circuit. This coil may, however, be short-circuited by the key K, at which times the current attains its full value. Hence the circuit is not opened in the usual sense, but to avoid sparking the contact points of key "K" may be immersed in oil.

The Lodge-Muirhead Wireless Telegraph System.—The transmitting and receiving circuits of this system are shown theoretically in Fig. 12. Closed oscillating circuits are employed. For short distances an induction coil with an external vibrating interrupter is utilized. For long distances an alternating current generator is employed. One of the important features of this system is the coherer *K*, which is a modification of the Castelli mercury coherer, previously described. It is termed an oil film coherer and consists of a rotating steel disk *d*, the lower edge of which enters a vessel *V*, containing a drop of mercury, but the disk is prevented from making contact with the mercury by a film of mineral oil. Electric oscillations in the circuit of the coherer cause the mercury and the disk to cohere, but decoherence takes place the moment the oscillations cease. In the figure *D* is the generator.

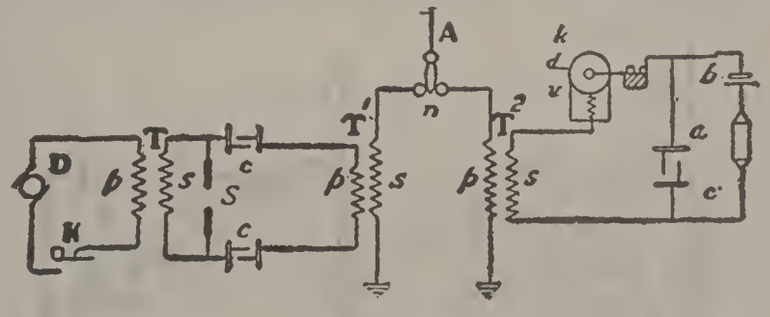


FIG. 12.
Lodge-Muirhead Transmitting and Receiving Circuits.

K is a manually operated Morse key. *T* is a step up transformer which raises the voltage to some desired value at the terminals of the secondary wire "s". "S" is the spark-gap consisting of upper and lower metal rods carried on an ebonite frame, *s*, *c*, *c*, *p* is the oscillating circuit, in which are excited the high tension oscillations that are thrown on the vertical wire *A*, via the secondary *s* of transformer *T'*. The vertical wire may be connected with the sending or

receiving circuits as desired by means of the switch *n*. The receiving circuits and apparatus are shown at the right of the figure. T_2 is a transformer the secondary of which, with the coherer *k*, and condenser *c'* comprise the receiving oscillating circuit. The variations of resistance in the coherer cause fluctuations of the current, due to the small battery *b*, with the result that the siphon recorder "a" is actuated, and records dots and dashes on a paper strip. As the currents in this local circuit that affect the recorder are all in one direction the recorder is brought to zero by a spring, the dots and dashes being therefore made on one side of the paper, not on alternate sides, as in the cases of the siphon recorder used in submarine cable signaling. The Lodge-Muirhead system is in operation in various parts of Great Britain.

Slaby-Arco Wireless Telegraph System.—There are several variations of this system in operation. For signaling over comparatively short distances, a 6-inch induction coil is sometimes used. For distances from 25 miles up to 50 miles a more powerful induction coil with a mercury turbine interrupter has been utilized, but this has been supplanted by a device termed the Grisson interrupter, which consists of a rotating commutator (motor driven) that by peculiar connections of the inductor converts a direct primary current into an alternating current, giving, it is claimed, a pure sine wave. For still greater distances an alternating current generator of three or more kilowatts is employed.

The principle involved in the operation of the Slaby-Arco transmitting and receiving circuits, shown theo-

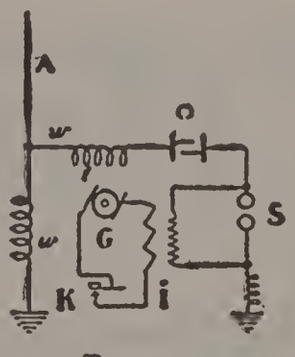


FIG. 13.

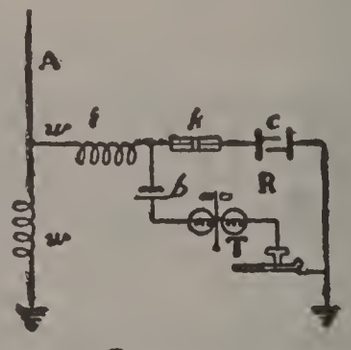


FIG. 14.

Slaby-Arco Transmitting and Receiving Circuits.

retically in Figs. 13 and 14, is that when very rapid oscillation of electricity are set up in a wire, one end of which is free and the other end is to earth, the maximum amplitude of oscillation or potential will be at the top or free end of the wire, and at the foot of the wire there will be a node. This is assuming that the wire is one-quarter the length of the transmitted wave. The manner in which this theory is

utilized is indicated in the figure. *A* is the vertical wire. A spool of wire *w* is placed in series in the vertical wire to add inductance to that wire, and by properly selecting this spool the wave length may be increased as desired. It would not be practicable to place the coherer at the top of the vertical wire to obtain the benefit of the maximum amplitude of potential at that point. But Dr. Slaby has found that when a horizontal wire is connected to the base of the vertical wire, a maximum of potential exists at the free end of that wire. He therefore places the coherer *k* in the wire *w'* at that end as shown. In the figures, "ii" are adjustable inductance coils, and "cc" are adjustable condensers, used in tuning the respective circuits. The coherer "k" consists of silver or platinum filings contained in a tube, which is exhausted of air to prevent oxidizing and to keep the filings dry and easily movable. In Fig. 13 *G* is the source of electromotive force for an induction coil *I*. *S* is the spark-gap which in practice is enclosed in a micanite case to deaden the noise, which in the case of powerful sparks is of a loud nature. In Fig. 14 R is a sensitive polarized relay. *T* is the tapper, the hammer of which in practice is placed in proximity to the coherer for the usual purpose.

The Braun-Siemens-Halske Wireless Telegraph System.—This system possesses several important features. First, the fact that the ground connection to the vertical wire is displaced by capacity areas consisting of large metal cylinders. Second, closed transmitting and receiving circuits. The theory of the transmitting and receiving circuits of this system is indicated in Figs. 15 and 16. C, C are the capacity areas. *T* is an induction coil, or "inductor," of peculiar construction, the primary of which has four turns of heavy wire; the secondary wire has forty turns of somewhat smaller wire, wound outside of the primary. This inductor is immersed in oil in a suitable containing vessel. It is designed to have low inductance and a small time constant. The primary *p* supplies inductance to the oscillating closed circuit *p*, *c*, *c*, *S*,

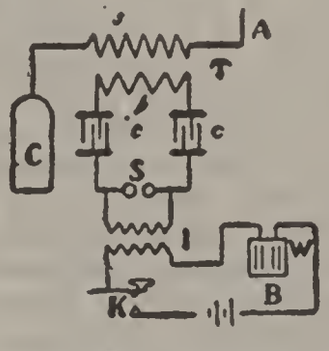


FIG. 15.

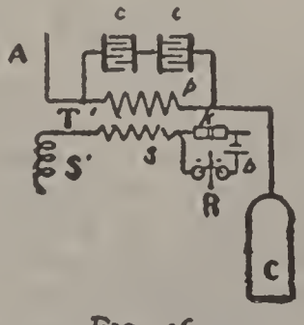


FIG. 16.

Braun Transmitting and Receiving Circuits.

this circuit being tuned by varying the capacity of Leyden jars "cc." "S" is the usual spark-gap. *I* is an induction coil provided with a Wehnelt electrolytic interrupter *W*. Key *K* is a telegraph key of heavy construction, capable of breaking currents of 50 amperes in the primary circuit of the induction coil. To prevent excessive sparking and to hasten the interruptions at the contact points of the key a magnetic blow-out is employed. In Fig. 16 it may be seen the conditions at the vertical wire are virtually reversed as compared with the arrangement in the transmitting circuit; the vertical wire *A* and condensers *c*, *c* and primary wire of a small transformer *T*, forming an oscillating circuit; the feeble received oscillations being thereby transformed to higher potentials in the secondary oscillatory circuit *s*, in which is the coherer *k*. One terminal of the coil *s* is connected to the coherer, the other terminal is connected to a loose coiled wire *s*. The vertical wire circuits and the oscillatory circuits are, in this system, also tuned to a corresponding rate of oscillations. R is a sensitive polarized relay, controlled by the detector *k*. The Braun detector is a filings coherer, the filings of which are of hardened steel contained in an ebonite tube. The tube is not exhausted of air, Prof. Braun not having found this to be necessary. It having been found that some magnetism is beneficial in the metal plugs between which the filings are placed in the tube, a magnetic ring is employed to give them any desired degree of magnetization. A clock-work operated tapper is used to decohere the filings.

Telefunken System.—This is a combination of the Slaby-Arco and Braun Systems, Count Arco being the present technical director. This is the best known of the foreign systems and is used extensively in many of the foreign countries as well as in America.

While the majority of those working in wireless were trying to obtain a continuous wave train, i. e., continued or connected oscillations, the Telefunken Company were working along entirely different lines. The new quenched spark system is a success while the efforts of the others have, so far, failed. The theory of the quenched spark system is to put all the energy of a discharge in a single oscillation and then allow the antenna circuit to swing or oscillate at its own natural period. This system produces very sharp tunning effects and today is being used by up-to-date wireless engineers.

The DeForest Wireless Telegraph System.—To avoid the recognized imperfections of the induction coil when operated with the ordinary interrupters, DeForest has from the first employed alternating current generators as a prime source of electric oscillations. Hitherto also he has avoided the use of any form of filings coherer and has utilized a detector known as a "responder," in

conjunction with a telephone; as the receiving instruments. This system has been employed commercially in this country and in Japanese and Chinese waters. The

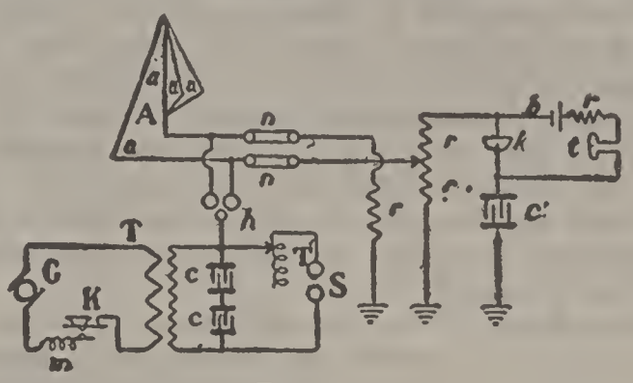


FIG. 17.
DeForest Transmitting and Receiving Circuits.

DeForest transmitting and receiving apparatus are outlined theoretically in Fig. 17. The transmitting system consists of the alternating current generator *G*. An impedance coil *M*. A telegraph key *K*. A transformer *T*. Spark-gap S. Inductance T' and Leyden jars, or condensers, C. The vertical wire is not directly attached to the transmitting circuit, but communication is made therewith across a short air space *h*. The oscillating circuit consists of the condensers *C*, spark-gap *S* and the inductance *T'*. This arrangement of the transmitting circuits is partially due to Mr. H. Shoemaker. The receiving circuits comprise the detector *k*, small condenser *c'*, tuning resistances *r*, *r*, *r*. The detector *k* is in a shunt circuit with a small battery "b", a variable resistance *r'* and telephone receiver *t*. The vertical wires *A* in this system are usually arranged as indicated in the figure. A number of the wires, *a*, *a*, *a*, are joined together, as shown, and connected to earth, for receiving, through a resistance *r*. A single wire *a'* is connected through tuning resistances with the detector *k*. These vertical wires are connected at the top. When the system is arranged for transmitting, the receiving apparatus is disconnected from the vertical wires by the knife switches *N*, *N*, and vice versa. In transmitting, the alternations are set up in the primary circuit of *T* by a generator *G*, giving an electric-motive force of about 200 volts. This is transformed to 20,000 volts or more in the secondary. Rapid oscillations are set up in oscillating circuit and these are thrown upon the vertical wire via the air space *h*. At the receiving station the incoming oscillations affect the detector *k* with the result that sounds of long and short duration are heard in the telephone during the time that signals are being transmitted. The detector *k* now used in this system consists of a very fine wire extending

into a liquid contained in a small cup. Another wire enters the cup at the bottom as indicated in the figure. The liquid is a slightly acidulated solution. Two theories are advanced as to the operation of this detector; one, held by DeForest, being that the action is electrolytic, the current from the small battery *b* normally setting up a counter-electro-motive force of polarization, which the arriving oscillations disturb, this effecting the desired result in the telephone. The other theory, due to Fessenden, will be mentioned in connection with the remarks on the Fessenden wireless system, next described.

The Fessenden Wireless Telegraph System.—The inventor of this system has made numerous improvements in the art of wireless telegraphy for which patents have been granted, and there are many variations of his system. The transmitting and receiving circuits and apparatus of one variation, omitting a number of details, are outlined theoretically in Fig. 18. In this figure *A* represents the antennæ composed of 15 or 20 vertical wires. *S* is the spark-gap. The transmitting apparatus is shown to the right of the spark-gap; the receiving apparatus to the left thereof. *T* is a suitable induction coil or transformer. *D* is a source of alternating current. *F* is a switch in the primary circuit of *T*, used to open that circuit when the system is set for receiving. Another switch, not shown, cuts out the receiving system automatically when signals are being transmitted from the home station. Preferably, Fessenden allows a continuous succession of pulsations to pass to the vertical wire, but varies the frequency of the oscillations by means of a tuning box or grid B. The receiving system be-

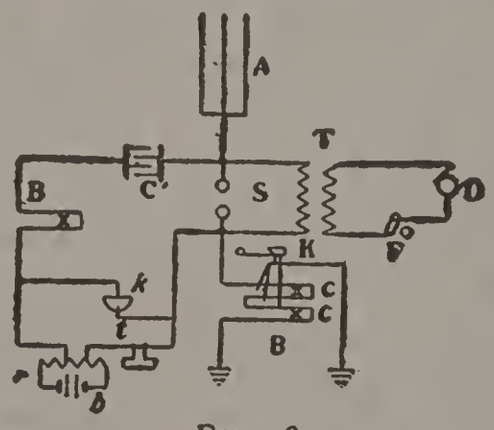


FIG. 18.
Fessenden Transmitting and Receiving Circuits

ing attuned to a rate of oscillations corresponding to the normal rate of the transmitting circuit will not respond to an abnormal rate emitted by the transmitter, when the inductance and capacity of that circuit, in B, is varied by the short circuiting prongs from the

key K, at the time the latter is depressed in sending. The capacity and inductance of the grid B are adjustable by means of sliding contacts *c c*. The oscillatory receiving circuit consists of the antennæ *A*, condenser *C*, tuning grid *B'*, detector *k* and wire to ground via *B*. The detector is in shunt with telephone receiver *t*, small battery *b* and adjustable resistance *r*.

Massie System.—Efforts of the inventor of this system have been directed towards a practical rather than a theoretical system, preferring to sacrifice a few miles in distance in order to obtain apparatus that will stand the hard usage generally given by indifferent operators. The Massie, like most of the systems of today is "tuned." Fig. 19 is a diagram of the system. On the transmitting side it will be noted that the condenser C and spark gap S are the reverse of other systems. In thus separating the charging and oscillating circuits many advantages are gained, principally that there is less danger of the high frequency discharges working back into the primary circuits which generally destroys the insulation of the apparatus. On the receiving side there is a radical change in the tuning method. Selectivity is not as close as in the Fessenden system which uses primary and secondary inductances but it has the advantage of a closed oscillating circuit, (*C'*, *d*, *c*, *b*, *f*, *e*, *C'*,). To explain: imagine a weight suspended on a spring, a very slight blow given each time the weight starts downward soon produces strong oscillations of the weight. On the other hand should blow be given while it is on its upward oscillation motion already imparted would be destroyed. Now, returning to Fig. 19, inductance *I'* and condenser *C'*, forms a closed oscillating circuit. When adjusted to resonance with the received waves, weak oscillations set up in *V*, *a*, *b*, *c*, *g*, will amplify oscillations in the closed circuit. The connection between one side of the condenser C' and b is a solid lever so that at any one point the capacity and inductance of the closed circuit *C'*, *d*, *c*, *b*, *f*, *e*, *C'*, is always the same, therefore, a pointer on this lever will indicate wave lengths direct, an advantage no other system has.

In the figure, *G* represents 110 volt A. C. generator; *T*, step-up transformer, secondary of which delivers potential of 12,500 volts to charge condenser *C* (2 series-multiple); S, spark gap; *I*, auto-transformer or tuning inductance; *A*, anchor gap, used to insulate the aerial for receiving. When transmitting this small gap is practically a short circuit for the high potential, high frequency oscillation. *G*, is the ground connection. On the receiving side *I'* is a tuning inductance; *C'* a variable condenser; *D*, detector; B, small battery condenser, function of which is to prevent the battery from short circuiting.

Shoemaker System.—Harry Shoemaker was one of the early inventors of wireless telegraph apparatus in this country. He was first connected with the International Wireless Telegraph Company which was later absorbed by the DeForest Wireless Telegraph Company. Certain parts of his system were combined with the DeForest system and to-day is spoken of as both the DeForest and Shoemaker System.

The Stone System.—In the Stone system an effort is made to secure the greatest possible freedom from interference due to atmospheric electrical disturbances and to waves from other wireless stations. In order to do this, it is deemed necessary to make the wave trains radiated from the transmitter as persistent as possible and to make the receiver as selective as possible. In carrying out this purpose the oscillations at the transmitting station are developed in a closed oscillating circuit loosely coupled to the aerial, in order that the wave trains may be as persistent as possible. The coupling between the primary oscillating circuit and the aerial is made variable, and when extreme persistency of oscillations or wave trains is desired, a further device is added, namely, a closed resonant circuit, which is interposed between the primary oscillator and the aerial. The coupling between the closed resonant or "weeding-out" circuit and both the aerial and the oscillating circuit is made variable.

At the receiving station the detector is included in a closed resonant circuit either loosely coupled to the aerial or to a resonant "weeding-out" circuit, which in turn is loosely coupled to the aerial.

It also includes a "break" key so-called, by which the receiving apparatus is automatically thrown into connection with the aerial whenever the transmitting key is not depressed in sending so that by the use of the "break" key a transmitting operator can hear a call from the receiving station while he is sending a message.

While the Stone system is not as extensively known as some of the others it has been installed on numerous vessels of the United States Navy and in some of their shore stations.

Wireless in the United States Navy.—The United States Government through the Navy Department has done more towards the development of "Wireless" than any other country and easily outranks all in having the most efficient service. This is the result of their encouragement of competition. The Navy Department have a chain of intercommunicable stations extending from Maine to New Orleans on the Atlantic Coast and from San Diego to Alaska on the Pacific. There are also intercommuncable stations in the West Indies, Hawaii and Philippines. At the present time they have a total of forty land stations and eighty-two ships.

By improvements in the detector and increased power of the generator of oscillations, signals are now transmitted 40 and 60 miles with two or three wires 80 feet in length.

A number of different arrangements of the vertical wires are now employed. For instance, in a number of wireless installations 4 to 20 wires or cables each containing 7 wires No. 18 or 20 gauge are suspended from a long strip of wood, which is upheld by insulators supported by a rope between the tops of two masts about 150 or 200 feet high. The leading down wires, two feet apart, drop vertically from one end ("L" aerial) or the middle ("T" aerial) to a similar wooden strip, where the wires are joined together and led into the instrument room. In other cases the wires are suspended from towers by well-insulated arms, and are kept apart by wooden spreaders until near the ground, when the wires are connected together and thence are carried into the operating room. In other cases a single mast is employed, from the top of which a number of wires are suspended in a circle. Each wire is attached, at a distance of about 50 feet from the top of the mast, to a guy-rope, which is itself attached to an anchor post in the earth, 100 feet or more from the base of the mast. The guy-rope thus first draws the wires away obliquely from the mast, then at its point of connection with the guy rope each wire is drawn toward the foot of the mast, where all the wires converge and are thence led into the operating room. This is known as an umbrella aerial.

Kites and captive balloons for supporting the vertical wires have frequently been availed of for temporary use and for military operations. The material of the vertical wire does not appear to affect the results. Iron, copper, and aluminum wires have been used. Wire netting has also been employed. The insulation of the vertical wires from the mast is however very important.

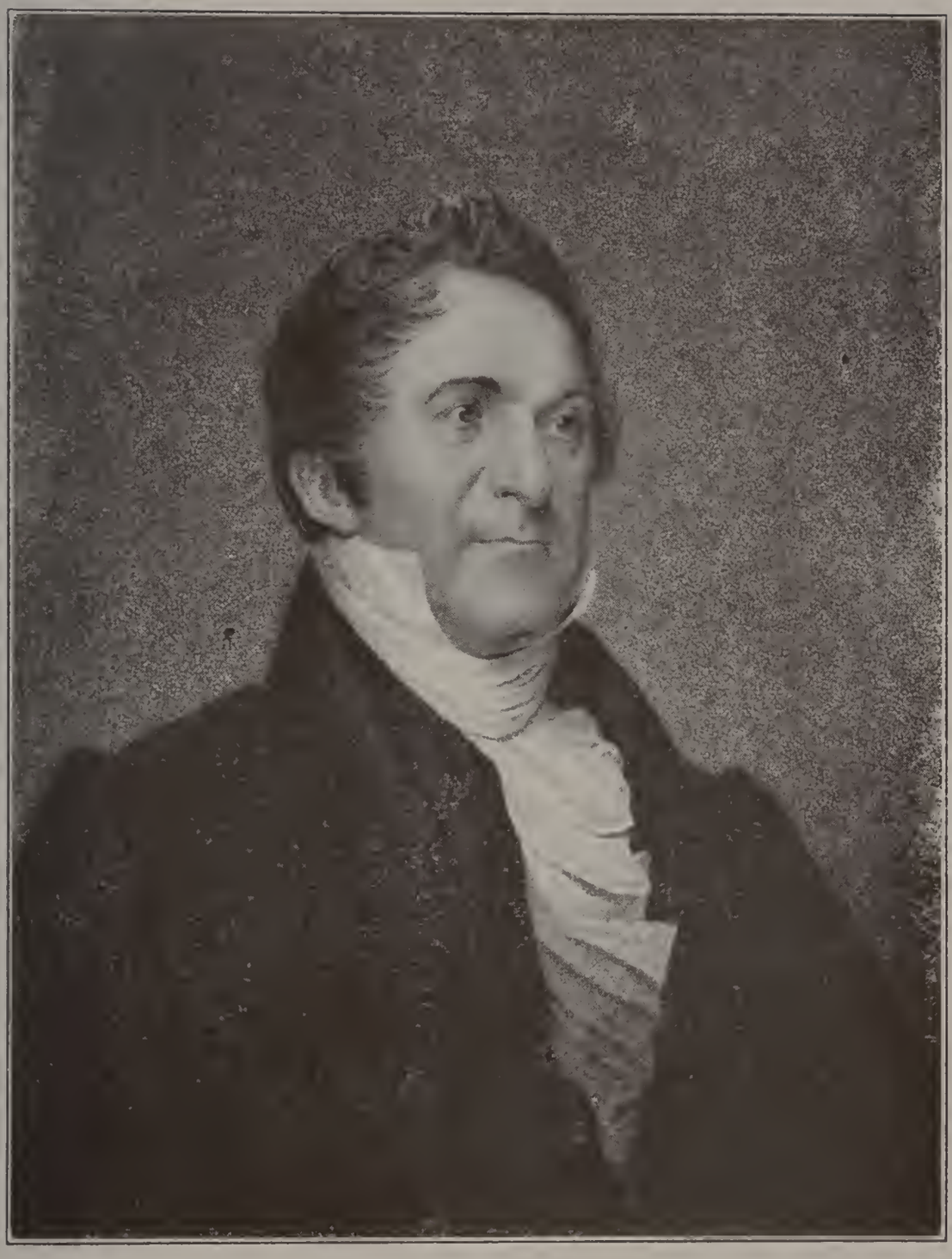
The main object in employing a number of vertical wires has been to obtain increased capacity wherein to store electrical energy to be radiated as electric waves, the vertical wires being one plate of a condenser, the earth the other plate, and the air the insulating medium. The effective capacity of closely adjacent parallel wires is not however proportional to the number of such wires, but is equal, roughly, to the square root of the number of wires. The capacity of a vertical wire .1 inch in diameter and 100 feet in length is .0002 micro-farad (Fleming).

For ordinary service the grounded antenna has been found to operate satisfactorily, but for tuned circuits the direct earth connection possesses some disadvantages. Thus variations in the resistance of the earth connections have introduced difficulties in the

way of maintaining exact tuning or synchronism. (See subsequent remarks on trans-Atlantic wireless telegraphy.) The grounded antenna also provides a path for the passage of atmospheric electricity to earth which frequently introduces disturbances in the wireless receiving circuits. To eliminate these difficulties a non-earthed aerial wire constructed practically as follows is sometimes utilized. Four masts, about 80 feet in height and 80 feet apart, are arranged in a square. From the tops of these masts a network of wire—about 6,400 square feet of netting—is supported. A similar network of wire, termed a "counterpoise" is upheld at the foot of the poles, and parallel with the upper network, by porcelain insulators about three feet above the earth. Vertical wires leading from the upper network pass to the wireless apparatus and thence to the counterpoise. This counterpoise is also sometimes termed an inductive earth. This arrangement has been most successfully used in the cold climates, in fact in Alaska the United States Signal Corps found this was the only satisfactory way of obtaining a ground. (See subsequent remarks on Ground Connections.) In shipboard practice the vertical wires are generally arranged between peaks of the masts. The wires are held apart by insulated spreaders and strung parallel, with two or more leading down wires attached to one end. So far this "flat top" or "inverted L" aerial has proven the most efficient. This arrangement is also used in land and shore stations. The size of, or amount of wire in an aerial is determined by the power of the transmitting apparatus. For a small station using from ¼ to ½ k. w. aerial should have a wave length of about 300 meters; for a 10 k. w. station a vertical of about 900 meter wave lengths. In high power aerials one or two wires are generally insulated from the rest to use in receiving, as, for certain detectors and tuning circuits a few wires are most efficient.

Ground Connection.—The term ground as applied to wireless should not be confused with the commonly known electrical ground. This latter is an earth connection made to obtain the least earth resistance between two points, whereas a ground for wireless should be a capacity (reservoir) large enough to absorb or dissipate all the electrical energy generated at the lower end of the antenna or spark gap, as the case may be, depending upon the arrangement and connections of the transmitting apparatus. This ground capacity may not necessarily be connected with the earth although an earth connection improves conditions in some cases.

The author has installed apparatus on all kinds of ships and equipped stations erected on all kinds of soil. On steamers connection should be made to several different points of the engine and boilers and if steel hull to various places of the steel frame work. There is no difference noted between wooden and steel hulls.



WILLIAM WIRT.

Their land stations are not only used for work with vessels of the Navy but give service to the merchant marine. In addition to handling regular messages they are utilized in collecting and disseminating information with regard to storms, derelicts, icebergs, and general meteorological information. Also through them at noon each day time signals are sent out. The apparatus used by the Navy includes practically all the various systems, and have adopted no particular system.

Signal Corps, United States Army.—The Signal Corps have also done their share in the development of wireless telegraphy and at the present time are arranging to equip all forts with sets of apparatus. It is through their efforts that many points in Alaska are in communication with the outside world today. They, like the Navy Department, do not discriminate as to apparatus, having various systems in use. Besides station equipments, the Signal Corps have developed a very efficient pack set for field use.

Present Uses of Wireless Telegraphy.—Wireless telegraphy has now passed through the experimental stage and is acknowledged by all to be a safe and reliable means of communication. As the sea is a virgin field for a means of communication, development of wireless telegraphy has been greater in this direction than on land. Communicating from ship to shore over a distance of 500 miles is a common occurrence to-day and there are instances where vessels have communicated very nearly 5,000 miles.

Practically all the civilized countries maintain land stations for the benefit of the mariners and in Canada a law has been passed compelling all ships of 400 tons and over to install wireless telegraph apparatus. The United States Government has passed a bill forcing certain classes of steamships to install wireless service.

Marconi has inaugurated a Trans-Atlantic service but up to the present time has not been able to give continuous service throughout the year.

It is now possible to receive several wireless messages at the same station simultaneously and interference has been practically overcome.

Bibliography.—Lodge, *Signaling Through Space Without Wires;* Vreeland, *Maxwell's Theory and Wireless Telegraphy;* Maver's *Wireless Telegraphy, Theory and Practice;* Robinson, *Manual of Wireless Telegraphy;* Massie and Underhill, *Wireless Telegraphy and Telephony;* Collins, *Wireless Telegraphy;* Erskine-Murray, *Wireless Telegraphy;* Sewall, *Wireless Telegraphy;* Fleming, *Principals of Electric Wave Telegraphy.*

WIRT, *wèrt,* William, LL.D.: orator and author: 1772, Nov. 8-1834, Feb. 18; b. Bladensburg, Md.; son of a Swiss father and German mother. After four years at

school with the Rev. James Hunt, and nearly two years of teaching and study in the family of Benjamin Edwards, in Md., young Wirt began legal practice at Culpeper Courthouse, Va. His marriage, 1795, to a daughter of Dr. George Gilmer, and residence with the latter near Charlottesville, brought him into a circle of acquaintance including Jefferson and Monroe. On the death of his wife, 1799, he removed to Richmond, and was there clerk of the house of delegates, and later, 1802, held for six months the office of chancellor of the e. dist. of Va. After an experiment, 1804-06, of residence at Norfolk he returned to Richmond, and became a leader at the bar there. In Burr's trial for treason at Richmond, 1807, Aug., Wirt's speech of four hours was an oratorical triumph whose fame has lasted to our time. He served in the Va. house of delegates in 1808 and 1816 became dist. atty. Under Pres. Monroe he held the cabinet position of atty.-gen., from 1817, Oct., and continued to hold it under Pres. J. Q. Adams until 1829, Mar. 4, when he resumed a very profitable practice of the law, and Virginian domestic life, with his second wife (daughter of Col. Gamble), whom he had married 1802. He published *Letters of the British Spy* (1803), and *Sketches of the Life and Character of Patrick Henry* (1817); besides numerous essays, addresses, and orations. A series of papers begun by him and several of his friends in 1810 under the title of *The Old Bachelor* appeared in 33 numbers of the *Richmond Enquirer* and afterward in book form. He delivered in 1826 in the hall of representatives in Washington a eulogy on Adams and Jefferson. In 1828 he was the candidate of the Anti-Masonic party for president of the United States. His *Life,* by J. P. Kennedy, appeared 1849.

WISCAS'SET, Maine: town, county-seat of Lincoln co,. on the Sheepscot river, and the Maine Central railroad; 40 m. n.e. of Portland. It is in a region noted for picturesque scenery, and is a popular summer resort. It has a good harbor, and is a port for coasting vessels; some vessels are built here, and the town also contains a shoe factory and large saw-mills. There is a national bank, capital $100,000, and a savings bank. It has several elementary schools, and a public academy (high school) founded in 1877. Pop. (1910) 1,287.

WISCHEHRAD [Old Slav. and Bohem. *wyschehrad,* Pol. *wyszogrod*]: name of numerous towns and castles in Slavonic countries—e.g., the original residence of the princess of Bohemia, now a quarter of the city of Prague. The word is composed of the root *wys* or *wysch,* high, and *hrad* [Russ. *gorod;* Pol. *grod;* in some dialects *grätz*], a fort, castle, town. *Hrad* is from the same root as AS. *hreod,* Eng. *reed, rod,* another form being *yerde* or *yard.* It signified primarily a place defended by rods or poles, a palisaded fort, hence a town. See TON.

WISCONSIN, *wĭs-kŏn'sĭn:* state; one of the United States of America; 30th in order of admission into the Union, 17th under the federal constitution; created a state from the Terr. of W., and admitted 1848, May 29; named from its principal river (F.), 'Ouisconsin,' and believed to mean in Indian 'wild rushing river;' popularly known as 'the Badger State.'

Location and Area.—W. is in lat. 42° 30′—47° n., long. 86° 53′—92° 53′ w.; bounded n. by Lake Superior, n.e. by Mich., e. by Lake Michigan, s. by Ill., w. by Io. and Minn.; extreme length n. to s. 302 m., extreme breadth 258 m.; land surface 54,450 sq. m., water surface 1,590 sq. m., gross area 56,040 sq. m. (35,865,600 acres); cap. Madison.

Topography.—The general surface is a level plain, with water-sheds in the n. and s., and several elevations in the s.w., the highest being Blue Mound, 1,729 ft. above sea-level. Cliffs form the e. limits of Green Bay and Lake Winnebago, from which the surface slopes e. to Lake Michigan. From the n. water-shed the surface slopes toward Lake Superior and toward the s. The Mississippi river forms the w. boundary for 250 m., and there receives the Wisconsin, Black, Chippewa, and St. Croix rivers, the latter forming a considerable part of the w. boundary. The St. Louis, Bois Brulé, Bad, and Montreal rivers flow into Lake Superior; the Menomonee, Peshtigo, Oconto, Pensaukee, and Fox into Green Bay; and the Manitowoc, Sheboygan, and Milwaukee into Lake Michigan. A canal connecting the Fox and Wisconsin rivers renders navigation possible between Green Bay and the Mississippi. Besides Lakes Superior and Michigan there are Green Bay—a long arm of Lake Michigan—Lake Winnebago, and a number of smaller and pretty lakes, including four around Madison. The n. part of the state is in forest; nearly all the remainder is arable, and much of it very fertile.

Climate.—The climate is healthful and without severe extremes; the waters of Lake Michigan moderate the summer heat and winter cold; mean annual temperature 40° in the n., 45° in the s.; wind, n.e. in spring, s.w. in summer, w. in autumn and winter; rainfall 23–34 in.; rainfall and melted snow in annual average 32 in.; snow precedes frost in the n.; winters long and cold, but with nearly uniform temperature; springs late; summers short; autumns mild and delightful.

Geology.—W. is rich in mineral resources, though but few products have been developed with thoroughness. The principal metallic ores are lead, zinc, iron, and copper, with some gold and silver. Lafayette, Iowa, and Grant cos.—in the s.w.—constitute the lead (galena) region; Dodge, Portage, Wood, Juneau, Bayfield, Ashland, Lincoln, Iron, and Oconto cos. contain the principal iron mines, which yield red and brown hematites, specular hematites, and magnetic ores. Other economic products are brick, potter's, and porcelain clays; cement rock; limestone, for lime, furnace flux, and building purposes; glass-sand; sandstone; granite; peat; asbestos; graphite; kaolin; and various precious stones, such as amethyst, carnelian,

agate, jasper, garnet, and malachite. Pearls are also found in merchantable quantities in certain streams near s. border. The principal forest growths are basswood, maple, hickory, elm, ash, black walnut, butternut, oak, birch, poplar, hemlock, cedar, and pine.

Zoology.—The wild animals include elk, deer, bear, beaver, wolf, wild-cat, porcupine, rabbit, squirrel, mole, bat, and field and shrew mice; birds of prey, gold and bald eagle, several species of hawk, great white owl, and crow, about 200 species of birds frequent to state; game-birds, duck, teal, woodcock, prairie and sharp-tailed grouse, partridge, and quail; and fish, white, lake trout, siscowet, muskallonge, perch, pickerel, and sturgeon.

Agriculture.—There are about 200,000 farms in the state, comprising approximately 25,000,000 acres. The principal crops are corn, wheat, oats, rye, barley, buckwheat, tobacco, potatoes, hay, beans and peas, sorghum, cherries, apples and berries. Dairy products are also valuable, while stock raising is very important, the total value of W's live stock being about $150,000,000.

Manufactures.—There are about 20,000 manufacturing establishments in the state, yielding products whose aggregate annual value is estimated at about $150,000,000. The most important industry is the manufacture of lumber and timber products, followed by flour and grist mill products, foundry and machine shop products, and paper and wood pulp. The large quantities of spruce, hemlock, and other woods used are furnished by the forests of the state. Other important industries are malt liquors, slaughtering and meat packing.

Minerals.—W. ranks well among the state of the Union as a producer of iron ore. Other valuable mineral products of the state are coke, coal, limestone, granite, sandstone, and mineral waters. The outputs of brick and tile and pottery are also notable, while cement is largely produced in the state, having kept pace with the growing demand for that product as a building material.

Commerce and Transportation.—W. has but one port of entry, Milwaukee, and there the foreign imports of merchandise aggregate over $2,000,000 a year, the exports for the same period averaging more than $500,000. The annual entrances and clearances of vessels at the same port during one year aggregate nearly 10,000 tons. There is, however, a large interstate traffic by means of the Great Lakes and the railroads. The first railroad was opened for traffic in 1850—20 miles of track. Subsequently the growth of the railroad system has been rapid and steady, until at the present time there is a total trackage of well over 7,500 miles, divided among many prominent roads. There is also a rather extensive electric street railway system. Water communication is facilitated by a canal communicating Lake Michigan with Green Bay. The internal revenue receipts for one year amount to about $10,000,000.

Area in Square Miles, 56,040.
Population, 2,069,042.
Number of Counties, 71.
Capital of State, Madison.
LAKE SUPERIOR
MICHIGAN
MINNESOTA
IOWA
ILLINOIS
GREEN BAY
LAKE MICHIGAN
WISCONSIN
SCALE OF MILES
0 10 20 30 40 50
Longitude West 90° from Greenwich

WISCONSIN.

Finance and Banking.—The total assessed valuation of property, including both personal and realty, is $2,743,180,404; the tax rate is $13.65 per $1,000, and the bonded debt of the state $2,251,000. This indebtedness is all in state trust funds, as follows: Public school fund $1,563,700; normal school fund $515,700; state university fund $111,000; and agricultural college fund $60,600. Through the observance of several constitutional restrictions against debt-making and many years of conservative financial management, the state has no public debt. There are about 100 national banks, nearly 200 state banks, and over 150 private banks.

Religion.—The strongest denominations in the State are the Roman Catholic, Methodist, Methodist Episcopal, Congregational, Regular Baptists, Evangelist, German Evangelist, and Presbyterian.

Education.—W. annually spends about $9,000,000 in the maintenance of its public schools, in which there are about 500,000 pupils enrolled, with nearly 15,000 teachers. There are also normal schools, colleges and universities for men only and co-educational colleges and universities, private secondary schools, and schools of technology, theology, law, medicine, etc. The most prominent among the institutions for higher education are Northwestern University, Lawrence University, Beloit College, Gale College, University of W., Milton College, Marquette College, Ripon College, Racine College, and the Seminary of St. Francis of Sales.

Charities and Corrections.—The most important charitable and corrective institutions which are supported entirely by the state include insane asylums at Oshkosh and Madison; a school for the deaf at Delavan; a school for the blind at Janesville; an industrial school for boys at Waukesha; a state prison at Waupon; a home for the feeble-minded at Chippewa Falls; and a state school for dependent children at Sparta. Besides these, the state partially supports the insane hospital, house of correction, and industrial school for girls, all in Milwaukee, and the W. Veterans' Home at Waupaca.

History.—The territory embraced within the limits of the present state of W. was first explored by Jean Nicollet, who in 1634 was sent by Frontenac, then gov. of New France, to open trade relations with the Indians occupying the shores of the lake now known as Winnebago. Nicollet parted with the Jesuit priests who started with him at the Isle des Allumetts, and with seven Hurons continued his journey till he reached a prosperous village of Algonquins on the site of the present city of Sault Ste. Marie. After resting awhile here he advanced to the Falls of St. Anthony, then entered the Straits of Mackinaw, descended to Lake Michigan, passed around Point Detour, and went ashore at Bay de Noquet, the n. arm of Green

Bay. From this point he went to the mouth of the Menomonee river, where he held a council with the Indians, and then slowly made his way to the mouth of the Fox river, and landed at a Winnebago settlement. Soon afterward he navigated Lake Winnebago until he reached the mouth of the Fox river, where the city of Oshkosh now stands, and then spent some time in exploring the interior and in visiting Indian tribes, including some in the present state of Illinois. He returned to Quebec in 1635. Twenty-three years afterward, two traders, Radisson and Groseilliers, undertook an exploration of the same region, spending the winter on the islands at the entrance of Green Bay, ascending the upper Fox river in the spring, and making friends with the Indians. Radisson was taken by the aborigines in their canoes up and down many of the rivers now within W., and entered the Mississippi in the summer of 1659. In 1660 the two traders returned to Canada, and in the following year started on a second expedition to W. by way of Lake Superior, reached Chequamegon Bay, and built a fort near the site of Ashland. About 1665, Pere Claude J. Allouez built a bark chapel and established the first Jesuit mission near this fort. The next explorers were Louis Joliet and James Marquette, who 1673 navigated a part of the Fox and Illinois rivers while on their way to and from the exploration of the Mississippi river. In the meantime the region 'bounded on the one side by the Northern and Western seas and on the other side by the South Sea,' then regarded as a part of the territory of Canada and subject to its laws, was formally occupied in the name of King Louis XIV. The treaty of Paris 1763 gave the territory here claimed by the French to Great Britain, and in that of 1783 it was ceded to the United States. In 1787 congress organized all the region n.w. of the Ohio river and e. of the Mississippi into the Northwest Territory. In 1809 the area of the present state was included in the limits of Illinois, and in 1818 in those of Michigan, which then also comprised the present states of Iowa and Minnesota and the greater part of the two Dakotas. Congress organized the Terr. of W. 1836, April 20; the first govt. under the act was established at Mineral Point in July; the first legislature met at Belmont in Sep.; and the seat of govt. was permanently established at Madison 1838, Nov. The first state constitutional convention was held 1846, and in the following year congress passed an act providing for the admission of the territory into the Union under the constitution framed 1846; but when that compact came before the people for ratification they took such exceptions to a banking clause in it that they rejected the whole draft. A second convention framed a constitution which received popular support 1848, Mar., and the territory was admitted as a state under it May 29, the first state legislature meeting in June following. Although ceded to the United States by Great Britain 1783, and brought under the territorial form of govt. 1787, the region was not wholly free from British domination till about 1815, and it was not till after the close of

the Black Hawk (q. v.) war, or about 1833, that it was relieved of Indian troubles and became tranquil. Excluding the original colonies, W. is one of the richest of the states in historical literature. Its chronology from 1634 is remarkably full, and a long line of historical writers has given the state a record of substantial merit, well-sustained development, and consistent civic pride.

Government.—The executive authority is vested by the constitution '(1848, amended 1867, 69, 70, and 82) in a gov., salary $5,000 per annum; lieut.-gov., $1,000; sec. of state, who is also auditor, $5,000; treas., $5,000; atty.gen., $3,500; railroad commissioner, $3,000; insurance commissioner, $3,000; supt. of public instruction, $1,200; commissioner of immigration and the usual subordinate officers—the gov., lieut.-gov., sec. of state, treas., atty.gen., and supt. of public instruction—being elected for 2 years each.—The legislative authority is vested in a legislature comprising (1903) a senate of 33 mem., elected for 4 years, and an assembly of 100 members, elected for 2 years, salary of all members $500 per annum and 10 cts. mileage, without additional pay for extra sessions. The legislature meets (since 1882) biennially, in odd-numbered years, on the second Wednesday in Jan., no limit to sessions. Insane, idiots, convicts, bribers, bettors, and duellists are excluded from voting.—The judicial authority is vested in a supreme court of a chief-justice and 5 assoc. justices, elected for 10 years, salary of each $5,000 per annum; circuit courts, judges elected for 6 years, salary of each $3,000 per annum; co. or probate courts, judges elected for 4 years; and justices of the peace, elected for 2 years. There are also 2 U. S. district courts, whose judges receive $3,500 each per annum.

The successive govs., with their terms of service, are as follows:

Territory.

Henry Dodge.....1836–41	N. P. Tallmadge.....1844–5
James D. Doty.....1841–44	Henry Dodge.....1845–48

State.

Nelson Dewey.....1848–51	William H. Taylor.....1874–76
Leonard J. Farwell.....1851–53	Harrison Ludington.....1876–78
William A. Barstow.....1853–55	William E. Smith.....1878–82
Coles Bashford.....1855–57	Jeremiah M. Rusk.....1882–89
Alexander W. Randall...1857–61	William D. Hoard.....1889–91
Louis P. Harvey.....1861–2	George W. Peck.....1891–95
E. Salomon (act'g).....1862–3	William H. Upham.....1895–97
James T. Lewis.....1863–66	Edward Scofield.....1897–19
Lucius Fairchild.....1866–72	R. M. La Foliette.....1901–05
C. C. Washburn.....1872–74	J. O. Davidson.....1906–09
	F. C. McGovern.....1910–

Counties, Cities and Towns.—W. is divided into 71 counties. In 1900 the most populous *counties* were: Milwaukee 330,017; Dane 69,435; Winnebago 58,225; Rock 51,203; Sheboygan 50,346; Dodge 46,631; Fond du Lac 47,589; Brown 46,359; Outagamie 46,247; La Crosse 42,997; Racine 45,644; and Manitowoc 42,261; and *cities and towns:* Milwaukee 285,351; La Crosse 28,895; Oshkosh 28,284; Superior 31,091; Racine 29,102; She-

18,310; Green Bay 25,236: Appleton 16,773; Fond du Lac 18,795; Janesville 13,894; and Ashland 11,594. In 1910 the chief *counties* were: Milwaukee 433,187; Dane 77,435; Winnebago 62,116; Dodge 47,436; Fond du Lac 51,610; Rock 55,538; Sheboygan 54,888; Brown 54,098; La Crosse 13,996; Outagamie 49,102; Manitowoc 44,978; Grant 39,007; Racine 57,424; Jefferson 34,300; Waukesha 26,398; Eau Claire 32,731; and Sauk 32,869; and *cities and towns:* Milwaukee 373,857; La Crosse 30,417; Oshkosh 33,062; Racine 38,002; Eau Claire 18,310; Sheboygan 37,100; Madison 25,531; Fond du Lac 14,610; Superior 40,384; Appleton 16,713; Marinette 18,797; Ashland 11,594; Wausau 16,560; Green Bay 25,236; Watertown 8,829; and Chippewa Falls 8,893.

Politics.—State, congressional, and presidential elections are held on first Tuesday after the first Monday in Nov. Citizens of the U. S. and aliens who have declared their intention of becoming citizens can vote if they have resided in the state one year and in the precinct 10 days. W. had 12 electoral votes under the apportionment on the 1900 census. The State now has 13 electoral votes. See PRESIDENT AND VICE-PRESIDENT, ELECTIONS OF.

Population.—(1840) white 30,749, colored 196, total 30,945; (1850) white 304,756, colored 635, total 305,391; (1860) white 773,693, colored 1,171, total 775,881; (1870) white 1,051,351, colored 2,113, total 1,054,670; (1880) white 1,309,618, colored 5,879, total 1,315,497; (1890) white 1,680,473, colored 2,444, total 1,682,917; (1900) 2,069,042.

The state census of 1905 gave the population of W. as 2,228,949, an estimate for 1907, by the state authorities gave 2,275,000. The population of school age, (1900) was 730,685; of voting age 570,715. There are 10,957 Indians in W. Pop. (1910) 2,333,860.

WISCON'SIN RIVER: stream of Wisconsin, rising in the n. centre of the state, and flowing s. and w. to join the Mississippi; length 270 m. A canal, completed 1850, connects with the Fox river; so that there is steamboat communication between Lake Michigan and the Mississippi.

WISCON'SIN, UNIVERSITY OF: state institution of learning at Madison, Wis. It was incorporated and located by the territorial legislature 1838, in view of a congressional grant of 46,080 acres for the purpose; and again incorporated by the state legislature, and a board of regents constituted 1848. The state constitution adopted that year provided that all lands granted by congress be converted into a permanent fund for the university. A preparatory dept. was formed 1849, and collegiate classes 1851. The grant of congress was increased to a total of 92,160 acres in 1854, and, to this, 240,000 acres were added under the act of congress, 1862, establishing agricultural colleges, as in some other states, where the proceeds of this grant were given to an appendix of existing institutions. The state made some appropriations for the building of halls, and since 1876 a tax of one-tenth of a mill on the valuation of the state has been a part of the permanent support of the institution. In 1868 a law school was added; and all departments have been open to women since 1867. The college of letters includes an 'ancient classical' course, a 'modern classical' course, and an English course. The college of arts comprises courses in general science and in the technical departments of agriculture, of pharmacy, and of civil, mining, metallurgical, and mechanical engineering. The sciences are taught in a long course and a short one. The long course in agriculture is four years, and requires for admission the same examination as for the general science course; the short course is of 12 winter weeks, open to all in farming pursuits. Veterinary science is taught by a professor. There is a prof. of agriculture, and, in the department that he represents, two chemists, and a director of agricultural institutes; an experiment station is connected with the department. There is also a director of normal institutes; a department of pedagogics; a school of economics; and one of music. Laboratories are numerous, including a machine-shop for work in wood and iron. Besides the usual languages taught, instruction is provided in the Scandinavian languages. The bachelor's degree is conferred in arts, in science, and in letters; and the master's degree on those who complete a course of post-graduate study. In 1906 there were 316 prof. and instruc., 3,166 stud., and a board of 14 regents having general management. 5,846 students have graduated since organization. The univ. grounds comprise about 350 acres along the shore of Lake Mendota, and contain over 20 buildings, of which 10 are stone and 6 brick. The various libraries contain 250,000 vols.; the productive funds aggregate over $531,623; and the total income 1906 was

$1,029,143. A new law building was erected 1893 (cost $86,000) and a gymnasium and armory 1894 (cost $116,000).

WIS'DOM: see WISE 1.

WIS'DOM, BOOK OF: one of the books of the Old Test. Apocrypha, in which it appears as the *Wisdom of Solomon:* see APOCRYPHA.

WISE, a. *wīz* [Dut. *wijs;* Dan. *viis;* Ger. *weise;* Goth. *veis:* Icel. *viss*, wise (akin to WIT, which see)]: having the power of discerning and judging correctly; knowing how to produce good effects; discreet; having much knowledge; judicious; prudent; grave; fitted to produce good effects, as *wise* measures or *wise* counsels; becoming a wise man; skilled in hidden arts or witchcraft; pious: N. in *OE.*, wisdom. WISDOM, n. *wĭz'dŭm*, the right use or application of knowledge; power of judging rightly; judicious conduct; prudence; sound judgment; piety. WISE'LY, ad. *-lĭ.* WISE'NESS, n. *-nĕs*, in *OE.*, wisdom. WISE'-HEARTED, a. knowing; skilful. WISDOM TOOTH, *popularly*, one of four large back teeth—the last molar on each side of each jaw—which do not generally appear till from the twentieth to the twenty-fifth year (see TEETH).

WISE, n. *wīz* [Ger. *weise*, way, method: F. *guise*, manner, fashion: from same root as WISE 1, the transition being from *wisdom, skill*, to the *manner* of doing a thing]: way; manner; mode; guise: now seldom used except as a postfix denoting 'manner, way of being or acting,' as *anywise, likewise, sidewise*, etc., or in such antiquated or colloquial phrases as—IN NO WISE, in no way: IN ANY WISE, in any way: ON THIS WISE, on this manner, etc.

WISE, *wīz*, HENRY ALEXANDER: statesman: 1806, Dec. 3—1876, Sep. 12; b. Drummondtown, Accomac co., Va. He graduated at Washington College, Penn., 1825; studied law at Winchester, Va.; settled and married at Nashville, Tenn., but two years later returned to his native country, and engaged in politics: in 1825 advocated the nomination of Gen. Jackson at the Baltimore convention; opposed nullification, but maintained the state-rights doctrines of Jefferson and Madison as expressed in the Virginia resolutions of 1798, that 'each state for itself is the judge of the infraction of the constitution, and of the mode and manner of redress.' Elected to congress 1833, he was involved in a duel with his opponent, whose arm he fractured. On the removal of the govt. deposits by Gen. Jackson, W. went over to the opposition or whig party, but was sustained by his constituents, over whom he had unbounded personal influence. In 1837 he was the second in a lamentable duel in which Graves, member of congress from Ky., shot Jonathan Cilley, an esteemed member from Me. In 1840 be secured the nomination of John Tyler as vice-pres.; and on Tyler becoming pres. by the death of Gen. Harrison, W. had a powerful influence in his administration. Nominated minister to France, he was rejected by the senate, but confirmed for Brazil, where he resided

until 1847. Now again acting with the democratic party, in 1854, after an arduous electioneering campaign, in which, though in feeble health, he travelled 3,000 miles, and made 50 stump speeches against the 'Know-nothing' or Prot. native American party, he was elected gov. of Va. In 1859 he published a treatise on Territorial Government, maintaining the right of congress over the institution of slavery. In Dec. of that year, he signed the death-warrant of John Brown (q.v.), hanged for treason in attempting to excite a negro insurrection. In 1861, as member of the Virginia convention, he labored for conciliation; but when his state voted for secession, he entered heartily into the war, and was appointed brig.gen., serving in the Kanawha valley, and later defending Roanoke Island, where his son was killed. He died at Richmond.

WISE, HENRY AUGUSTUS: naval officer and author: 1819, May 12—1869, Apr. 2; b. Brooklyn, N. Y.; son of George Stuart Wise, of the U. S. navy, and cousin of Gov. Henry A. Wise, of Va. He was educated at Philadelphia; entered the navy 1834, Feb. 8; became passed midshipman 1840, July 16; was promoted to master 1846, Oct. 31; lieut. 1847, Feb. 25; served during the Mexican war on the Pacific station; in the coast survey 1850–52; in the Mediterranean 1852–54; and at Boston and Washington 1854–60. In the civil war he served off Charleston, S. C., 1861; was promoted commander 1862, July 16, and assistant chief of the bureau of ordnance and hydrography 1862–69; with rank of capt. from 1866, Dec. 29. He married, 1848, a daughter of Edward Everett. He published *Los Gringos* (1849); *Tales for the Marines* (1855); *Scampavias* (1857); *Gray African Parrot* (1859); and *Captain Brand* (1860).

WISE, ISAAC MAYER: Jewish rabbi: b. Steingrub, Bohemia, 1819, Apr. 3. He was educated at Prague and at Vienna; appointed rabbi of Radnitz, Bohemia, serving 1843–46; came to America 1846; settled at Albany, N. Y., 1846–54; then at Cincinnati, where he has held a conspicuous position as a liberal Jewish minister and a representative of reform in Amer. Judaism. He secured a union of Hebrew congregations favoring reform, and has been pres. of a Hebrew union college. His *Minhag America*, a special ritual for Jewish use, has been widely adopted. As a writer and lecturer, his activity has been constant and effective. His published works are: *History of the Israelitish Nation* (1854); *Essence of Judaism* (1860); *Doctrines and Duties of Judaism* (1862); *Martyrdom of Jesus* (1874); *The Cosmic God* (1876); and *History of the Hebrew Second Commonwealth* (1880).

WISE, JOHN: patriot Congregational clergyman: 1652, Aug.—1725, Apr. 8; b. Roxbury, Mass. He was graduated at Harvard 1673, and settled for life as minister in Ipswich 1683, Aug. 12. In 1688 the boldness with which he took the lead in opposing arbitrary taxation under Gov. Andros was visited with imprisonment, deprivation of office as minister, and a fine of £50 and costs. The town paid the fine for him, and sent him as representative to Boston. He

went 1690 as chaplain in the expedition to Canada. His greatest distinction rests on his publications of 1710, *The Churches' Quarrel Espoused*, and 1717, *Vindication of the Government of the New England Churches*, in which he thoroughly demolished a scheme, championed by the Mathers, for establishing associations of ministers authorized to govern the local churches in the Presbyterian way. These writings served very widely as an effective exposition of democracy in both church and state.

WISE, JOHN SERGEANT: lawyer and politician: b. 1846, Dec. 25, at Rio Janeiro, Brazil; son of Gov. Henry A. Wise. He was educated at a milit. institute in Va., took part while a cadet in the battle of Newmarket, Va., served on Confederate staff duty through the war, then returned to study of law at the Univ. of Va., was admitted to the bar 1867, and settled in practice at Richmond. He was U. S. dist. atty. 1882–3; was elected to congress 1882 for one term, and 1885 was republican candidate for gov. of Va., defeated by Fitzhugh Lee.

WISEACRE, n. *wīz'ā-kėr* [Ger. *weissager*, a prophet—not from *weise*, wise, and *sagen*, to say, but a corruption of OHG. *wizago*, a prophet, from *wizan*, to see—parallel to AS. *witega*, a prophet—from *witan*, to see]: one who makes undue and foolish pretensions to great wisdom; a would-be-wise person; a fool; a simpleton.

WISEMAN, *wīz'man*, NICHOLAS, D.D.: cardinal and Rom. Cath. abp. of Westminster, England: 1802, Aug. 2—1865, Feb. 15; b. Seville; of an Irish family settled in Spain. He was brought to Ireland in childhood, and received his first education at Waterford, whence he was removed to the Rom. Cath. college of St. Cuthbert at Ushaw, near Durham. In his 16th year he entered as an ecclesiastical student the English College at Rome, and after a very brilliant course received holy orders at Rome 1823, was given the degree D.D., and was appointed vice-rector of the English College, and prof. of oriental languages in the Univ. of the Sapienza. In 1828 he published his *Horæ Syriacæ*, and in the end of that year was named rector of the English College. In this office he delivered his *Lectures on the Connection of Science and Revealed Religion* (2 vols. 8vo 1836). In England he became known first by lectures on *The Doctrines of the Catholic Church*, at Moorfields Church, published in two vols. 1836. In the same year he established, in concert with O'Connell, the *Dublin Review*, a journal which has since been the quarterly organ of the Rom. Cath. body. In 1840 he was named coadjutor vicar-apostolic of the central district of England, with the title Bishop of Melipotamus *In Partibus* (q.v.) *Infidelium*. At the same time he was appointed pres. of St. Mary's College of Oscott, where he made his residence W.'s remarkable abilities as a polemical writer came into prominence in the dissensions in the Church of England during the Tractarian controversy; and he issued various lectures, pamphlets, reviews, essays, etc. In 1846 he was transferred as coadjutor vicar-apostolic to the

London district, and 1849 became acting vicar. In 1850 he became still more notable during a change in the position of the Roman Church in England, which, for a time, occasioned great religious excitement. From the reign of Elizabeth, the sees in England having been occupied by bishops of the Established Church, and it being penal for a bishop of the Rom. Cath. Church to officiate under a territorial title in England, the Rom. Catholics, for the necessary religious ministrations of their church, had resorted to the well-known expedient of a system of bishops *In Partibus* (q.v.) *Infidelium*, with the title and authority of Vicars-apostolic. This form of church govt., with some modification, had subsisted from the time of James I.; but from the date of the passing of the Rom. Cath. Emancipation Act, a desire had arisen among Rom. Catholics for restoration of the normal form of church govt. by the appointment of regular bishops. This measure was finally determined on by the pope 1850, and a new distribution of the kingdom was made into 12 sees (one of them archiepiscopal), in which, in order that it might not be supposed to clash with the Anglican episcopal system, the names of the ancient sees were carefully avoided, the titles of the new bishops being taken exclusively from cities and towns which were non-episcopal. Dr. W. was named abp. of the see of Westminster, which included great part of the district already under his charge, and he was at the same time created cardinal. This measure, for which the Prot. public were not prepared, and which was made more formidable by the language employed, though following the established canonical forms and bearing only on the spiritual concerns of the Rom. Catholics, was supposed to involve an invasion of the rights and dignities of the Established Church and of the crown, and roused a storm of religious excitement unexampled in the memory of the living generation. While this excitement, much influenced by a letter addressed by the prime minister to the bp. of Durham, was at its height, the new cardinal, who had gone to Rome to receive the cardinal's hat, returned to England. and published an explanatory address of great ability and moderation, yet firmly asserting the strictly constitutional rights of the members of his church, entitled *An Appeal to the Reason and Good Feeling of the People of England on the Subject of the Catholic Hierarchy.* This address, with lectures subsequently delivered by him, and extensively circulated, did much to mitigate the excitement, which nevertheless led to violent debates in parliament, and to the passing of an act prohibiting the use of ecclesiastical titles other than those recognized by the law: see Ecclesiastical Titles Assumption Act. Notw thstanding these unfavorable circumstances, the abilities and literary eminence of Cardinal W. eventually compelled the admiration of the British public. He took frequent occasion, moreover, by public lectures and addresses on the neutral subjects of education, literature, and art, to place himself on the side of progress and with the national sentiments of Englishmen; and notwithstanding the infirm

ity of his constitution, which began to fail soon after his return to England as cardinal, he published a succession of works whose earnest Rom. Cath. bias did not prevent their commending themselves to the sympathies of cultivated Englishmen. The *Lectures on Religion and Science* already referred to; *On the Connection between the Arts of Design and Those of Production;* on the *Influence of Words on Thought and Civilization;* on the *Points of Contact between Science and Art; Recollections of the Last Four Popes*, and similar works, obtained an extensive circulation; and through these, and through the reaction from what was soon felt to have been an exaggerated alarm, W. gained the respect of the public at large. He was a scholar of rare and various attainments, an eminent linguist, an orator, a graceful and vigorous writer, and an accomplished critic of art. In addition to the works mentioned above, he published, among many other books and essays, *Fabiola, or a Church of the Catacombs*, a singularly life-like picture of early Christian life in classic Rome; and *Sermons* (2 vols. 8vo 1864). He also left many MSS. In 1866 appeared *The Witch of Rosenburg, a Drama in Three Acts;* and (1868) *Daily Meditations.*

WISE MEN FROM THE EAST, The: see Magi.

WISH, n. *wĭsh* [AS. *wyscan*, to wish: Icel. *ósk*, desire: Ger. *wunsch*, wish]: desire; eager desire or longing; an expression of desire in respect of something, or in regard to some one, as good *wishes;* the thing desired, as, I have got my *wish:* V. to desire; to be disposed or inclined; to long for; to call down upon; to imprecate; in *OE.*, to recommend. Wish'ing, imp. Wished, pp. *wĭsht.* Wish'er, n. *-ẽr*, one who wishes. Wish'ful, a. *-fûl*, having or showing a desire; eager; earnest; longing. Wish'fully, ad. *-lĭ.* Wish'fulness, n. *-nĕs*, the state or quality of being wishful.

WISHART, *wĭsh'ẽrt*, George: early Scottish Reformer: d. 1546, Mar. 1. He is supposed to have been a native of Forfarshire, son of James W. of Pittarrow. W. emerges into notice in the beginning of the 16th c., when, as teacher of a grammar school at Montrose, he made himself remarkable by introducing the study of Greek. He began also to preach the doctrines of the Reformation; but was obliged to flee to England. He is traced at Bristol about 1538, preaching the same doctrines; but being seized and threatened with death, he publicly recanted. Later he was at Cambridge, in the centre of the Anglican Reform movement under Bilney and Latimer. About 1543 he returned to Scotland. He appears to have had great power as a preacher. Knox (see Knox, John) gives in his *History*, Book I., a striking description of the effects of W.'s preaching, whose most important effect was on Knox himself, who became his personal attendant. His activity and influence were too prominent long to escape notice. Cardinal Beaton (q.v.) had had his eye on him; and while W. rested at Ormiston, after preaching a powerful sermon at Haddington, he was made prisoner by the Earl of Both-

well, was conveyed to St. Andrews, and immediately put on trial before an ecclesiastical tribunal. He was condemned to be burned at the stake; and the sentence was executed before the castle or episcopal residence at St. Andrews.

Beaton's own death took place about three months after Wishart's martyrdom, in accordance, it is said, with the prophecy uttered by Wishart at the stake. This has appeared to some recent writers to strengthen the suspicion, otherwise suggested, of Wishart having been accessory to a plot for assassinating the cardinal. On this whole question the evidence is not decisive.

WISHAW, *wĭsh'aw:* police burgh of Lanarkshire, Scotland; 15 m. s.e. of Glasgow. The town is irregularly built, though there are some fine streets. The neighboring coal fields are extensive, and more than one million tons are annually shipped. It has also numerous iron-works, fire-clay works, and a distillery.—Pop. (1901) 20,869.

WISH'WASH, n. *wĭsh-wŏsh* [imitative of the sound of the dashing of a thin watery liquid]: any weak thin drink, in the sense of not being of the proper quality or strength. WISHY-WASHY, a. *wish-i-wosh-ĭ,* thin and pale, said of liquid; not of the proper strength or quality as a liquid; without force or solidity: N. a liquor weak and watery.

WISMAR, *vĭs'mâr:* seaport of Mecklenburg-Schwerin, Germany; at the head of the Bay of Wismar, an inlet of the Baltic. Its harbor is the best on the Baltic coasts, and is furnished with ship-building docks. Its old fortifications have been removed; but many of its old buildings, exceedingly curious and picturesque, remain. Commerce, the fisheries, tobacco, and sail-cloth manufactures, and agriculture are principal employments; there are also breweries and distilleries. Wismar is the terminus of a branch of the Mecklenburg railway, and has communication by steamers with Copenhagen. There entered (1888) 461 vessels, of 79,605 tons; cleared 477, of 82,998 tons.—Pop. (1880) 15,518; (1885) 16,011; (1890) 16,787; (1900) 20,222.

WISNER, BENJAMIN BLYDENBURG: American clergyman: b. Goshen, N. Y., 1794, Sep. 19; d. Boston, Mass., 1835, Feb. 9. He was graduated at Union College in 1813 and at Princeton Theological Seminary in 1820. In 1821-32 he was pastor of the Old South Church, Boston, Mass. In the latter year he became secretary of the American board of commissioners for foreign missions, which office he held until his death. Among his works are: *History of the Old South Church* (Boston 1830); *Moral Condition and Prospects of the Heathen* (1833).

WIS'NER, GEORGE Y., C.E.: American civil engineer: b. West Dresden, N. Y., 1841, July 11; d. 1906. He was graduated at the University of Michigan in 1865;

served in government survey on the Mississippi river and the Great Lakes 1865-80, and on surveys of the Mississippi, Illinois, and Des Plaines rivers 1880-4. He was superintendent of the 10th and 11th United States Lighthouse districts 1884-7. His publications include: *Geodetic Field Work* (1883); *Brazos River Harbor Improvement* (1891); *Breakwaters, Sea Walls and Jetties* (1893); *Hydraulics of Rivers Having Alluvial Beds* (1896); *Sewage Disposal* (1896); *Report of Deep Waterway Commission* (1900); *Canals from the Great Lakes to the Atlantic* (1900); etc.

WISP, n. *wĭsp* [OE. *wisp, wips:* Low Ger. *viep*, a wisp: Ger. *wisch*, a bunch of something for wiping (see also WHISK)]: a small bundle of straw or hay, or the like substance; a Will-o'-the-wisp (q.v.).

WISSEMBOURG, *vēs-sŏng-bôr'* (German *Weissenburg, vīs-sĕn-bûrch*): town of the German province of Lower Alsace since 1871, but prior to that time a fortified town of France; on the Lauter; 34 m. n.n.e. of Strasburg. It has an evangelical and a Rom. Cath. church, a gymnasium, and a tribunal of justice; and manufactures of hosiery, hats, leather, lucifer matches, etc., and a large lithographic establishment. The first great battle of the Franco-German war was fought here 1870, Aug. 4. Besides the fortifications of Wissembourg, demolished 1872, the Lines of Wissembourg are famous —a line of works extending 9 m. s.e. to Lauterburg.— Pop. (1900) 6,946.

WISSMANN, HERMANN VON: German African explorer: b. Frankfort-on-the-Oder, 1853, Sept. 4; d. 1905, July 15. He entered the German army, reaching the rank of lieutenant in 1874, and crossed the African continent in the employ of the German African Society (1880-2). He commanded an expedition sent out by Leopold II., in 1884-5, and as imperial German commissioner, suppressed the Arab revolt under Bushiri, but failed in attempting to take two steamers to Lake Victoria via Nyassa and Tanganyika lakes in 1892. He was governor of German East Africa in 1895-6, and pres. of the Berlin Geographical Society in 1897. He published *In the Interior of Africa* (3d ed. 1891); *Under the German Flag Across Africa* (1880-3); *My Second Crossing of Equatorial Africa* (1891); *Africa: Descriptions and Advice* (1895); etc.

WIST, v. *wĭst* [AS. *wiste*, knew, was conscious, pt. or *witan*, to know: Ger. *wissen*, to know (see also WIT)]: in *OE.*, pt. and pp. of the verb *wit*, to know, knew; was conscious; imagined. WISTFUL, a. *wĭst'fûl* [said to be a corruption of *wishful*]: full of thought; attentive; pensive; earnest; longing. WIST'FULLY, ad. *-lĭ*, attentively; earnestly. WIST'FULNESS, n. *-nĕs*, the state or quality of being wistful. WIST'LY, ad. *-lĭ*, in *OE.*, attentively; earnestly.

WISTAR, *wĭs'tẽr*, CASPAR, M.D.: physician and anatomist: 1761, Sep. 13—1818, Jan. 22: b. Philadelphia, Pa.; son of a noted merchant, Richard Wistar, whom the Friends disowned for supporting the war of the revolution. He was graduated in medicine at the University of Pennsylvania, 1782, spent 1783 in England, went thence to Edinburgh, and there received his degree 1786. On returning to Philadelphia 1787, he became one of the Dispensary physicians, was prof. of chemistry and the institutes of medicine in the College of Philadelphia 1789-92, adjunct prof. of anatomy, midwifery, and surgery 1792-1808, and held the chair of anatomy 1808 to his death, with the highest distinction. He was a member of the Amer. Philos. Soc. from 1787, and its pres., succeeding Thomas Jefferson, from 1815. He published *A System of Anatomy* (1814).

WISTAR, ISAAC JONES: American penologist: b. Philadelphia, Pa., 1827, Nov. 14; d. 1905. He was educated at Haverford College, Pa., and served in the Civil War as brigadier-general of volunteers, U. S. A., 1862-5. He was president of the Academy of Natural Sciences of Philadelphia 1892-6, has been inspector of the Eastern penitentiary of Pennsylvania, was pres. of the State Board of Charities of Penn., and founded the Wistar Institute of Anatomy and Biology, named in honor of Caspar Wistar.

WISTA'RIA: a genus of leguminous climbers, named in honor of Caspar Wistar, an American anatomist (1761-1818), which contains several species, natives of China, Japan, and North America, the correct scientific name of which does not seem to be thoroughly settled. They are high-climbing, hardy shrubs, and have odd pinnate leaves, with entire leaflets and large, terminal, pendulous racemes of papilionaceous flowers. These have large standards, and wings freed from the keel, which is incurved and obtuse and are usually purple or white in color. The fruits are coriaceous legumes, opening readily. Nearly all of the wistarias are cultivated for covering walls, verandas, trellises, etc. The Chinese wistaria (*W. chinensis*), which was introduced into England about 1816, is perhaps the best. It has profuse dense clusters of pea-shaped flowers, which are about a foot long, and bloom in May before the leaves appear and occasionally again in autumn. When grown over a trellis, the blossoms depend in great masses of blue. This vine is a rampant grower, and the flowering wood may be known by its short, jointed, antler-like growth, and absence of climbing spines.

Wistaria is a favorite plant of the Japanese, who have a variety (*W. chinensis*, var. *multijuga*), with racemes a yard long, loosely flowered, and with small blossoms, which are fragrant, however. These they train about their houses and over trellises in greatest profusion. The American wistaria (*W. frutescens*) or kidney-bean tree,

is not so vigorous as the Chinese species, and has slightly pubescent racemes, only about 6 in. long. It is found, when wild, climbing over trees at the edges of swamps from Virginia to Florida, and improves with cultivation.

WIS'TER, Annis Lee Furness: American translator: b. Philadelphia, Pa., 1830, Oct. 9; d. 1908, Nov. 15. She was a daughter of W. H. Furness and was married to Dr. Caspar Wister (d. 1888) in 1854. She made many translations of note, among them: E. Marlitt's *The Old Mamselle's Secret* (1868); *Gold Else* (1868); *The Countess Gisela* (1869); *The Little Moorland Princess* (1873); and *The Second Wife* (1874); Wilhelmine von Hillern's *Only a Girl* (1870); Hackländer's *Enchanting and Enchanted* (1871); Volkhausen's *Why Did He Not Die* (1871); Von Auer's *It is the Fashion* (1872), and Fanny Leward's *Hulda; or, The Deliverer* (1874). Her translations were issued in a uniform edition of 30 volumes in 1888. With F. H. Hedge she published *Metrical Translations and Poems* (1888).

WISTER, Owen: American novelist, grandson of Frances Anne Kemble; b. Philadelphia 1860, July 14. He was graduated from Harvard in 1882, studied law and was admitted to the Philadelphia bar in 1889, but from 1891 has devoted his attention to literature. He has been especially successful in his delineation of Western life and character and has published *The Modern Swiss Family Robinson* (1883); *The Dragon of Wantley: His Tail* (1892); *Red Men and White* (1896); *Lin McLean* (1898); *The Jimmy John Boss and Other Stories* (1900); *U. S. Grant, a Biography* (1900); *The Virginian*, which has been widely popular and has been successfully dramatized (1902); *Oliver Wendell Holmes* in *American Men of Letters* series (1902); *Benjamin Franklin* in *English Men of Letters* series (1904); *Lady Baltimore* (1906); *Mother* (1907); etc.

WIT, v. *wĭt* [AS. *witan;* Goth. *vitan;* Dut. *weten;* Dan. *vide;* Ger. *wissen;* Icel. *vita,* to know]: to know; to be or become aware; to be informed; now used only in the phrase *to wit,* signifying 'namely,' 'that is to say;' and in a few compounds, as *outwit; wit* is the infinitive mood; *wot* is the 1st and 3d pers. of the present indicative, with *wost* (erroneously *wottest*) as the 2d pers. sing. of same tense; *wist* (erroneously *wotted*), pt. pp. To do one to wit, to cause one to know. Wit'tingly, ad. *-ĭng-lĭ,* with knowledge; by design. Wit, n. the power or faculty of knowledge; understanding; intellect; the power of associating ideas in a manner new and unexpected, and so connected as to produce pleasant surprise; display of resemblance between dissimilar things, in a ludicrous sense; a man who excels in giving expression to unusual and striking ideas in such a manner as to create amusement or pleasant surprise; sound mind, in plu., as, 'have you lost your *wits?*' soundness of understand

ing; ingenuity; in *OE.*, imagination. WIT'TED, a. having wit or understanding—usually the latter part of a compound, as *sharp-witted.* WIT'TY, a. *-tĭ,* possessed of wit; full of wit; facetious. WIT'LESS, a. *-lĕs,* destitute of wit or understanding; thoughtless; inconsiderate. WIT'LESSLY, ad. *-lĭ.* WIT'LESSNESS, n. *-nĕs,* the quality of being witless. WIT'TILY, ad. *-tĭ-lĭ,* in a witty manner; with an ingenious association of ideas; with artful pleasantness. WIT'TINESS, n. *-nĕs,* the quality of being witty. WIT'TICISM, n. *-sĭzm,* an expression or phrase in which ideas are so unexpectedly associated as to create amusement or pleasant surprise; a witty remark or saying; a phrase or sentence affectedly witty. WIT'LING, n. *-lĭng,* a pretender to wit. WITS, senses, understanding. TO BE AT ONE'S WITS' END, to have exhausted the last known contrivance or plan; to be at a loss what further step or measure to take. TO LIVE BY ONE'S WITS, to live by shifts and expedients, as one without any regular employment or occupation.—SYN. *of* 'wit, n'.; humor; satire; irony; sarcasm; burlesque; wag; humorist;—of 'witty'; sharp, acute; keen; arch; satirical; taunting; ironical.

WITCH, n. *wĭch* [AS. *wicce;* Fris. *wikke,* a witch: Low Ger. *wikken,* to soothsay, to divine—from same root as *wizard*]: a person (originally of either sex, but now more particularly a woman) supposed to have supernatural power and knowledge by compact with evil spirits; a sorceress; a fascinating woman: V. to fascinate; to enchant; to bewitch. WITCH'ING. imp.: ADJ. bewitching; favorable to enchantment or witchcraft. WITCHED, pp. *wĭcht.* WITCH'CRAFT, n. *-krăft* [*witch* and *craft*]: the practices or powers of a witch; supernatural power; enchantment; irresistible fascination. WITCH'ERY, n. *-ĕr-ĭ,* fascination; a powerful and mysterious influence; charm. WITCH-MEAL, the pollen or powder of the lycopodium or club-moss, which, from its inflammable nature, is used in theatres to produce a sudden flash or blaze, in order to imitate lightning.

WITCH'CRAFT: practice of the black-art. Witchcraft is simply the form that the belief in the arts of magic assumed under the action of certain notions introduced by Christianity.

Not a little light is thrown on the original conception of Witchcraft, and the magic arts in general, by observing the primary meaning of the various terms employed in connection with them. Most noticeable is the number of those terms that come from roots signifying simply *to do, perform.* From this notion the transition is easy to a variety of shades of meaning, as is seen in Lat. *facinus,* which radically signifies a deed [from *facere,* to do], but became restricted to a *bad* deed, a crime. The Greek ερδειν or εργειν (=Eng. work), and the Lat. *facere, operari,* were used, without any addition, as denoting to perform sacrifice or other sacred or magical rite. Accord-

ingly, in Low Lat. *factura* signified sorcery; and in modern It. *fattura*=incantation, and *fattucchiera*=a sorceress or witch. Lat. *factum* becomes in Sp. *hecho*, and means a crime, while *hechicero* is a sorcerer, and *hechiera* a witch. The Portuguese *feitiçao*, magic, also is from Lat. *factum*; and Skr. *kratu*, a sacrifice, is from *kri* (=Lat. *creare*), to make.

The Eng. *witch* is *vicce* in AS. which has also *vician*, to fascinate, and *viccancräft*, the art of magic: the Low Ger. dialects have similar forms (e.g., Dutch *wikkerij*=witchcratt); in High Ger. there are no cognate names. These words, as is seen in the Dutch form, have clearly no connection with *witan* (Ger. *wissen*), to know, which is usually given as the root of the English *witch*; and the most probable etymology is that proposed by J. Grimm, who derives them from the Gothic *veihan* (OHG. *wihan*, mod. Ger. *weihen*), which signified to consecrate, but which he infers to have meant primarily to do, make, perform (see *Deutsche Myth.*, pp. 36, 58, 408; *Deutsche Gramm.* III. 181). *Wiht*, or *wicht*, is evidently a derivative from this root, and signified a thing made (Lat. *factum*), a creature, a person, and, in some Teutonic dialects, a demon. A *vicca* was thus a *doer* of sacred or magic rites (compare the 'I'll do, I'll do, I'll do!' of Shakespeare's witches). *Wicked* is a participle from the same root, and signified primarily bewitched, accursed, hence perverse. *Wizard* is probably a masculine form of *vicca*.

Nearly corresponding to English *witch* were the Lat. terms *saga*, a knowing or wise woman; *strix*, *striga*, a kind of nocturnal bird, hence a witch; *venefica*, literally, a poison-maker, a concocter of drugs. The Ger. *hexe*, O. dutch *hagetisse*, AS. *hägtesse*, or *hägesse* (from which Eng. *hag*), appear to come from *hag*, cognate with Lat. *sagus*. In O. Norse *hagr* signifies dexterous, cunning.

The powers supposed to be possessed by the witches, and the rites and incantations by which they acquired those powers, were substantially the same as belonged to the devotees of the Greek Hecate (q.v.) the Striga and Venefica of the ancient Romans, and the Vala or Wise Woman of the Teutonic pagans. But when, along with the knowledge of the one Living God, the idea of a purely wicked spirit, the enemy of God and man, was introduced, it was natural that to him should be ascribed supernatural powers not proceeding directly from the true God. This gave an entirely new aspect to such arts: they became associated with heresy; those who practiced them must be in compact with the devil, and have renounced God and the true faith. Previously, if a witch was punished, it was because she had been guilty of poisoning, or at least was believed to have poisoned or wrought some other actual mischief. Now, however, such power was only the power to work evil; and merely to be a

witch was in itself a sin and crime that filled the pious mind with horror. This feeling, zealously fostered, first by the Rom. Cath. clergy, and then no less by the Prot., rose to a frenzy that for four centuries filled Europe with shocking bloodshed and cruelty.

Almost all the various notions and practices noticed under the titles MAGIC, DIVINATION, INCANTATION, AUGURIES, CHARM, TALISMAN, ORDEAL, FETICH, EVIL EYE, etc., are embodied more or less prominently in a huge mass of superstitions which formed the creed of Witchcraft in its full development: see the above titles; also ASTROLOGY: ALCHEMY. What was new and distinctive in the Witchcraft of Christendom was the *theory* of magical arts which it involved. The doctrine of the Devil (q.v.), as finally elaborated in the middle ages, established in the world a rival dominion to that of the Almighty. The Archfiend and his legions of subordinate Demons (q.v.) exercised a sway, merely permitted, no doubt, but still vast and indefinite, not only over the elements of nature, but over the minds and bodies of men—all except those who had been admitted by baptism into the number of the 'redeemed' (see ATONEMENT), and who continued to be guarded by the faith and rites of the church. The faithful could not be led into evil against their will, nor essentially injured in person; but not even they were altogether exempt from diabolic annoyance, for the immunity does not seem to have extended to their belongings. As a strictly logical consequence of this assumed constitution of things, it followed that those mortals who had the gifts of producing supernatural effects of any kind (and that such gifts had been possessed by individuals in all ages and countries was not for a moment questioned) must derive their power from the Prince of Darkness, and be acting as his agents—always excepting, of course, those miraculous powers which the church herself claimed to exercise in the name of Heaven. Moreover, as the universally coveted powers of fortune-telling, and of controlling the elements for personal benefit or for the hourt of enemies, could not be supposed to be bestowed by a being of the devil's character except as a *quid pro quo,* and as the object dearest to the devil's heart—the very aim and end of his struggle with the kingdom of light—was to win back as many as possible of the souls that had been redeemed from his dominion by the death of Christ, it was natural to conclude that the price that he would demand for his gifts would be a renunciation of Christ and an entrance into his service. Hence it became the established belief that, to acquire the powers of witchcraft, the person must formally sell his or her soul to the devil. The idea of a covenant with the Archenemy was not involved in the early and heathen conception of magic. Originally, magic was identical with the lowest form of religion—that is, Fetichism

(q.v.). It was grounded on the idea that certain natural objects and certain rites and observances had, in themselves, a mysterious power of producing wonderful effects; and the art of the magician consisted in the knowledge of these mysterious powers, and in the skill to combine and direct them to special purposes. The effects were not conceived as being produced by the interference of any conscious being—god or devil: on the contrary, a human being could, through magical means, acquire control over supernatural beings. The Hindus carry this notion so far, that they represent some of their sages as practicing austerities and performing sacrifices and other rites, until they can control the gods themselves, and even threaten their destruction together with that of the universe (see VISWÂMITRA). The higher kind of European magic in the middle ages was mixed with what physical science there then was; and the most noted men of the time were addicted to the pursuit, or were at least reputed to be so. So far from deriving his power from the kingdom of darkness, the scientific magician, by the mere force of his art, could compel the occasional services of the Archfiend himself, and make inferior demons the involuntary slaves of his will. A belief, however, had early existed that individuals in desperate circumstances had been tempted to purchase, at the price of their souls, the help of the devil to extricate them from their difficulties (see THEOPHILUS); hence a suspicion began to grow that many magicians, instead of seeking to acquire their power by the laborious studies of the regular art, had acquired it in this illegitimate way. At last, as the system of dualism above mentioned became more complete, the art of magic was wholly diabolized, and a compact with the Evil One was thought to be the sole character of supernatural power: see FAUST. This transformation took place earlier and more completely (about the 13th c.) in regard to those lower forms of the magical art which constitute witchcraft proper, and which have from ancient times been considered the special province of women. For the chief cause of the prominent part assigned to the female sex in this matter, see MAGIC: moreover, their more excitable temperament renders them peculiarly liable to those Ecstasies (q.v.) which have been associated with the gift of divination from the priestess of the ancient heathen oracle down to the medium of modern spiritualism. Further, when witchcraft came to be prosecuted as heresy, the part assigned to woman in the Scripture account of the Fall led to her being regarded as specially suited to be the tool of the devil. Founded on this circumstance, a constant element of the creed of witchcraft came to be the belief in a carnal intercourse between witches and evil spirits. The devil was supposed to tempt them in the shape of a wooer, and the unholy compact was consummated in carnal fashion.

The bargain was usually in writing, signed with the witch's own blood. She was rebaptized, receiving a new name, and had to trample on the cross and renounce God and Christ (among Roman Catholics, also the Virgin Mary) in forms parodying the renunciation of the devil in the formula of Christian baptism. A mark was impressed on some part of her body; this mark remained forever after insensible, and was one of the means of discovery employed by the witch-finders. The powers conferred by Satan on these covenanted servants of his were essentially the same as had always been attributed to sorcerers; the mode of exercising them was also the same —namely, by charms, incantations, concoctions, etc. The only change was in the theory. These mystic rites, instead of producing their effects by an inherent virtue, were merely symbols by which the witch conveyed her behests to the devil and his ministers, who obeyed them according to the compact. Another difference to be noted is, that the power was directed exclusively to work evil—to raise storms, blast crops, render men and beasts barren, inflict racking pain on an enemy, or make him pine away in sickness (usually done by making an image of wax, and sticking it full of pins, or setting it to melt away before the fire). If a witch attempted to do good, the devil was enraged, and chastised her. A remarkable circumstance is, that witches seem to have been powerless to serve their own interests, for they remained poor and miserable.

A prominent point in witchcraft was the belief in stated meetings of witches and devils by night, called *Witches' Sabbaths.* First anointing her feet and shoulders with a salve made of the fat of murdered and unbaptized children, the witch mounted a broomstick, distaff, rake, or the like, and, making her exit by the chimney, rode through the air to the place of rendezvous. If her own particular demon lover came to fetch her, he sat on the staff before, and she behind him; or he came in the shape of a goat, and carried her off on his back. At the place of assembly, the archdevil, in the shape of a large goat, with a black human countenance, sat on a high chair, and the witches and demons paid homage by kneeling to him, and kissing his posteriors. The feast was lighted up with torches, all kindled at a light burning between the horns of the great goat. Among the viands there was no bread or salt; and they drank out of ox-hoofs and horses' skulls; but the meal neither satisfied the appetite nor nourished. After eating and drinking, they danced to music played on a bagpipe, with a horse's head for the bag, and a cat's tail for a chanter. In dancing, they turned their backs toward one another. In the intervals, they narrated to one another what mischief they had done, and planned more. The revel concluded with obscene debauchery; after which the great goat burned

himself to ashes, which were divided among the witches, to raise storms with. They returned as they came; and the husband was kept from being aware of the wife's absence by a stick being laid in the bed, which he mistook for her. The places of meeting were always such as had associations of solemnity and awe, derived from tradition or otherwise: the more noted are known to have been places of sacrifice in pagan times (see WALPURGIS-NIGHT).

The *prosecutions* for witchcraft form one of the most deplorable episodes in human history. They show more strikingly than anything else has ever done, on one hand, what relentless cruelty human nature is capable of under a fanatical delusion; and on the other, how little reliance is to be placed on the concurrence of any number of witnesses when any extensive excitement prevails on a subject involving the sentiment of wonder. Multitudes will be found testifying, and testifying honestly, to alleged facts which fall in with the prevailing belief, but have no better foundation than their own heated imaginations.

In the early laws of Rome, the Twelve Tables, there were penal enactments against him who should bewitch the fruits of the earth, or conjure away his neighbor's corn into his own field. A century and a half later, 170, Roman ladies were convicted of poisoning under the pretense of charms and incantations; which led to additional laws against such practices. But in all this, the penalties were directed against those who had done, or were believed to have done, positive injury to another; and this is probably the meaning of the Mosaic law against witchcraft. At all events, in the heathen world, the mere possessing, or being believed to possess, supernatural powers was not in itself a crime. It was feared, no doubt, as being liable to be turned to malicious purposes; but on the whole, magic was deemed a beneficial art, being, in fact, the only form of the healing art known, and in part also the religion of domestic life. This view of the subject continued for many centuries after the reception of Christianity. Constantine, in the 4th c., while ordaining capital punishment for those who practiced noxious charms against the life or health of others, is careful to protect from prosecution all magical means used for good—such as warding off hail-storms and excessive rains (*Codex Justin.*, lib. ix., tit. 18); and the distinction between *black* and *white* magic was long retained. It was through the prosecutions against heresy, which were systematically organized in the 11th c. (see INQUISITION), that the magic arts came gradually all to be dyed black alike. Together with errors in doctrine, the heretics were almost always accused of magical practices, and their secret meetings were represented as a kind of devil-worship, attended with all kinds of abomi

nations: thus sorcery and heresy became synonymous; and to the dread of supernatural power was added the feeling of pious horror. White magic, no less than black, was now looked upon as the work of Satan; and the counter-charms against the malice of him and his agents were to be sought only in the rites of the church as ministered by the accredited servants of Heaven. The belief in this ecclesiastical white magic was accepted from the Roman Church by the Prot. clergy at the time of the Reformation, and was as zealously cultivated by them as by the Roman priesthood.

Fostered chiefly by the proceedings against heresy, the popular dread of witchcraft had been on the increase for several centuries; and numerous executions had taken place in various parts of Europe. At last Innocent VIII., by his celebrated bull, *Summis Disiderantes,* 1484, gave the full sanction of the church to the prevalent notions regarding sorcery, and charged the inquisitors and others to discover and put to death all practicers of these diabolical arts. Two special inquisitors, appointed for Germany (to which country the bull was specially directed), Heinrich Institor and Jacob Sprenger, with the aid of a clergyman of Constance, Johannes Gremper, drew up the famous *Malleus Maleficarum,* or Hammer for Witches; in which the whole doctrine of witchcraft was systematized, a regular form of trial laid down, and a course of examination appointed by which inquisitors everywhere might best discover the guilty. From this we may date the beginning of the witch-mania proper. The edict of 1484 was subsequently enforced by a bull of Alexander VI. 1494, of Leo X. 1521, and of Adrian VI. 1522—each adding strength to its predecessor, and the whole serving to increase the agitation of the public mind on the subject. The results were dreadful. A panic fear of witchcraft took possession of society; every one was at the mercy of his neighbor. If any one felt an unaccountable illness, or a peculiar pain in any part of his body, or suffered any misfortune in his family or affairs; or if a storm arose, and committed any damage by sea or land; or if any cattle died suddenly; or if any event, circumstance, or thing occurred out of the ordinary routine of daily experience—the cause of it was witchcraft. To be accused was to be doomed; for it rarely happened that proof was wanting, or that condemnation was not followed by execution. Armed with the *Malleus Maleficarum,* the judge had no difficulty in finding reasons for sending the most innocent to the stake. If those accused did not at once confess they were ordered to be shaved and closely examined for the discovery of devil's marks; and if any strange mark was discovered, there remained no longer any doubt of the party's guilt. Failing this kind of evidence, torture was applied, and this seldom failed to extort the desired confession from the unhappy victim.

A large proportion of the accused witches, in order to avoid these preliminary horrors, confessed the crime in any terms which were dictated to them, and were forthwith led to execution. Other witches seemed to confess voluntarily, being probably either insane, or feeble-minded persons whose reason had been distorted by brooding over the popular witchcraft code.

In Germany the prosecutions were carried to a frightful extent. In the small bishopric of Bamberg, 600 fell victims to the delusion in about four years; and in Würzburg, which is not much larger, 900. In the small district of Lindheim, a twentieth part of the population were sacrificed in the same space of time. Similar accounts are on record regarding the other countries of Europe. In Geneva, in three months (1515-6), 500 persons were burned. In the district of Como, 1,000 were burned in one year (1524), and 100 per annum for several years afterward. In France, about 1520, fires for the execution of witches blazed in every town; and throughout the 16th c. the provincial parliaments were incessantly occupied with witch-trials and enactments against them, especially against that form of the superstition known as Lycanthropy (q.v.): see also WEREWOLF.

In England and Scotland, the witch-mania was somewhat later than on the continent; but when it came, it was little if at all less virulent—the Reformation notwithstanding. The statute of Elizabeth, 1562, first made witchcraft in itself a crime of the first magnitude, whether directed to the injury of others or not; and the act of James VI., in the first year of his reign in England, defines the crime still more minutely: 'Any one that shall use, practice, or exercise any invocation of any evil or wicked spirit, or consult or covenant with, entertain or employ, feed or reward any evil or wicked spirit, *to or for any purpose;* or take up any dead man, etc.; such offenders, duly and lawfully convicted and attainted, shall suffer death.' Many years had not elapsed after the passing of the statute, ere the delusion, which had previously wrought occasional local mischief, became an epidemic frenzy, devastating every corner of England. The poor creatures who usually fell victims are thus described by an able observer: 'An old woman with a wrinkled face, a furred brow, a hairy lip, a gobbler tooth, a squint eye, a squeaking voice, or a scolding tongue, having a ragged coat on her back, a spindle in her hand, and a dog by her side—a wretched, infirm, and impotent creature, pelted and persecuted by all the neighborhood because the farmer's cart had stuck in the gateway, or some idle boy had pretended to spit needles and pins for the sake of a holiday from school or work'—such were the poor unfortunates selected to undergo the last tests and tortures sanctioned by the laws, and which tests were of a nature so severe that no one would have inflicted them on the vilest of murderers. They were ad-

ministered by a class of wretches, who, with one Matthew Hopkins at their head, sprang up in England in the middle of the 17th c., and took the professional name of *witch-finders*. The practices of the monster Hopkins, who, with his assistants, moved from place to place in the regular and authorized pursuit of his trade, will illustrate the tests referred to, and the horrible fruits of the frenzy. From each town which he visited Hopkins exacted the stated fee of 20s., and in consideration thereof he cleared the locality of all suspected persons, bringing them to confession and the stake in the following manner: He stripped them naked, shaved them, and thrust pins into their bodies to discover the witch's mark; he wrapped them in sheets, with the great toes and thumbs tied together, and dragged them through ponds or rivers, when, if they sank, it was held as a sign that the baptismal element did not reject them, and they were cleared; but if they floated—as they usually would do for a time—they were then set down as guilty, and doomed. He kept them fasting and awake, and sometimes incessantly walking, 24 or 48 hours, as an inducement to confession; and, in short, practiced on the accused such abominable cruelties, that they were glad to escape from life by confession. If a witch could not shed tears at command, said the further items of this wretched creed, or if she hesitated at a single word in repeating the Lord's Prayer, she was in league with the Evil One. After he had murdered hundreds, and pursued his trade for many years—from 1644 onward—the tide of popular opinion finally turned against Hopkins, and he was subjected, by a party of indignant experimenters, to his own favorite test of swimming. It is said that he escaped with life, but from that time he was never heard of again.

The era of the Long Parliament witnessed an increased number of executions for witchcraft, 3,000 persons being said to have perished during that period, by legal executions, independently of summary deaths at the hands of the mob. Witch-executions, however, were continued with nearly equal frequency long afterward. One noted case occurred 1664, when the enlightened and just Sir Matthew Hale tried and condemned two women, Amy Dunny and Rose Callender, at Bury St. Edmunds, for bewitching children. It is stated that the opinion of the learned Sir Thomas Browne, who was accidentally present, had great weight against the prisoners. He declared his belief that the children were truly bewitched, and supported the possibility of such possessions by long and learned arguments, theological and metaphysical. Yet Sir Matthew Hale was one of the wisest and best men of his time, and Sir Thomas Browne had written an able work in exposition of Popular Fallacies. Chief-justices North and Holt were the first individuals occupying high places who had at once the good sense and

the courage to set their faces against the continuance of this delusion, and to expose the general absurdity of such charges (1694). Summary executions, however, continued to be frequent for some years, in consequence of confessions extracted after the Hopkins fashion. In 1716 a Mrs. Hicks and her daughter, aged nine, were hanged at Huntingdon for selling their souls to the devil, and raising a storm by pulling off their stockings and making a lather of soap. With this crowning atrocity, the catalogue of murders in England closes.

In Scotland, witchcraft as a crime *per se* was first made legally punishable by an act passed in the reign of Mary (1563). On coming to execute the functions of majesty, James VI. made numerous official investigations into alleged cases of witchcraft, and derived a pleasure in questioning old women respecting their dealings with Satan. In 1590 James made a voyage to Denmark to bring home his appointed bride, the Princess Anne. Soon after his arrival, a tremendous witch-conspiracy against the happy conclusion of his homeward voyage was discovered, in which the principal agents appeared to be persons considerably above the vulgar. The king had all the accused brought before himself for examination, and even superintended the tortures applied to them to induce confession. One of them, Mrs. Agnes Sampson, declared that one great object with Satan and his agents was to destroy the king; that they had held a great witch-convention at North Berwick for no other end; and that they had endeavored to effect their aim on many occasions, and particularly by raising a storm at sea when James came across from Denmark. The witches demanded of the devil why he bore such hatred to the king, who answered that the king was the greatest enemy he had in the world. On this occasion, 30 persons were executed on the Castle-hill of Edinburgh. These proceedings, no doubt, gave occasion to the famous work on Demonology which James VI. published shortly after. The removal of James to England moderated but did not stop the prosecutions. As the spirit of Puritanism gained strength in Scotland, they again increased. The general assembly was the body in fault on this occasion, and from this time forward the clergy were the great witch-finders in Scotland. The assembly passed condemnatory acts (1640, 43, 44, 45, 49), and with every successive act the cases and convictions increased with even a deeper degree of attendant horrors than at any previous time. At a single circuit at Glasgow, Stirling, and Ayr 1659, 17 persons were convicted and burned for this crime. The popular frenzy seems to have exhausted itself by its own virulence 1661-2. After this period the dying embers of the delusion only burst out on occasions here and there into a momentary flame. The last regular execution for the crime is said to have taken place at Dornoch 1722, when an old woman was condemned by

David Ross, sheriff of Caithness. The number of victims in Scotland from first to last has been estimated at more than 4,000.

In the British colonies of New England also, the witchcraft mania raged. As in Scotland and elsewhere, the clergy were the prime movers. Cotton Mather obtained a special notoriety for his part in this matter. He was considered a prodigy of learning and piety, but his writings and proceedings in regard to the trial and execution of witches, of which he was a chief instigator, show a high degree of the same fanaticism, credulity, and blind cruelty which has long been prevalent among even the highest classes in England. The earliest execution for witchcraft in New England is said to have been 1648: the chief outbreak of the fanaticism was at Salem 1691-2, when 19 persons were hanged (not burned). The next year 50 persons were tried; but only three were convicted, and they received the governor's pardon. A complete revulsion of public feeling soon took place, and the delusion was utterly broken in Massachusetts, though continuing for a time in Europe. For details of New England witch-trials, see No. 141 of *Chambers's Miscellany of Tracts;* and Bancroft's *History of the Colonization,* etc., III. 84.

Dr. Sprenger, in his *Life of Mohammed,* computes the entire number of persons who have been burned as witches during the Christian epoch at *nine millions.*

Throughout the middle ages, it is doubtful if one person could have been found who doubted the reality of witchcraft; and it was not till the middle of the 16th c. that any one had courage to raise his voice against the enormities which the delusion was occasioning. The first, probably, to do so was a physician, J. Weier (*De Præstigiis Dæmonum,* etc.), in Germany 1563. He was followed 1584 by Reginald Scot (q.v.), 'a solid and learned person, beyond almost all the English of that age' (Hallam), who demonstrated the absurdity and impossibility of the prevalent notions. The delusion, however, was still in the ascendant, and found multitudes of defenders, who branded the skeptics as 'Sadducees.' The most prominent of these champions was James VI. of Scotland, who, through his treatise on Demonology (1597), and his activity in the inquisition of cases, is entitled to rank with Pope Innocent and the inquisitor Sprenger, as at the same time a chief enemy and chief encourager of witchcraft. At last the world began to awaken from the horrid nightmare; the feelings of the humane began to be shocked by the continued butchery, and the more intelligent to question, if not the existence of witchcraft, at least the evidence on which the accused mostly were condemned. Advocates took courage to defend a reputed witch; and judges, like North and Holt in England, to throw doubt on the proceedings; and the frenzy gradually subsided all over Europe. Individual cases occurred

later on the continent than in Britain. A man was put to death at Würzburg as late as 1749 on a charge of sorcery; and a witch was burned at Glarus, in Switzerland, 1782. Probably the latest instance in Europe of a judicial execution for witchcraft occurred 1793, in the grand duchy of Posen. The laws against witchcraft were formally repealed in England 1736, in Austria not till 1766.

The cessation of judicial proceedings, however, did not at once put an end to popular outrages on supposed witches. In 1751 an aged female pauper and her husband were killed by a mob near Tring, in Staffordshire; and for the murder one of the perpetrators was tried and put to death. Not longer ago than 1863, a reputed wizard was drowned in a pond at the village of Hedingham, in Essex, England; and it was considered worthy of notice that nearly all the 60 or 70 persons concerned in the outrage were of the small-tradesmen class, none of the agricultural laborers being engaged in the affair. Besides such violent outbreaks, striking revelations are frequently made, in the course of judicial proceedings, of how deep-seated and general the dread of witches continues to be throughout the more ignorant strata of European society, especially in rural places; and, concurrent with this, the faith in the skill of certain 'wise men' and 'wise women' (white witches) to counteract their malicious practices. As recently as 1867, a man calling himself Dr. Harris (S. Wales) was committed for trial for duping various persons by persuading them that their ailments were caused by their being 'witched,' and pretending to cure them by giving them written charms to wear.

The belief in magic or sorcery continues to be an energetic belief of the ignorant and degraded all over the world, no matter what their nominal religion is. To the mass of the adherents of Buddhism in central Asia, the lama or priest is merely a wizard who knows how to protect them from the malignity of evil spirits; and, according to Livingstone and other travelers, trials and executions for witchcraft are at this day common throughout Africa, as they were in Europe in the 17th c., and under forms ludicrously similar: see ORDEAL: MAGIC.

Of the numerous books on witchcraft, we note the following: *Sadducismus Triumphatus, Sadducism Vanquished, or, Considerations About Witchcraft,* a work vindicating the belief in witchcraft, by Dr. Joseph Glanvil, chaplain-in-ordinary to Charles II., who was one of the first fellows of the Royal Soc., and wrote a meritorious treatise showing the value of skepticism in science. R. Baxter (q.v.), in his *Certainty of the World of Spirits,* upholds the same side. A successor of Glanvil, D. F. Hutchinson, chaplain to George I., in his *Historical Essay Concerning Witchcraft* (1718), writes from the skep-

tical point of view. H. Williams's *Superstitions of Witchcraft* (1865) takes a wide historical view of the subject, and evinces extensive reading. C. Mackay gives a good digest of it in brief space in a section of his work on *Extraordinary Popular Delusions* (1841). Thomas Wright's *Narratives of Sorcery and Magic* (2 vols. 1852) contains a large collection of the most interesting stories of individual cases. Soldan, *Geschichte der Hexenprocesse* (Stutt. 1843); Ennemoser, *Geschichte der Magic*, 2d ed. (Leip. 1844; translated by W. Howitt, Lond. 1854). L. F. Alfred Maury, *La Magie et l'Astrologie dans l'Antiquité et au Moyen Age* (Lond. 1860), attempts to give a philosophy or theory of all superstitious beliefs. J. Grimm, *Deutsche Mythologie*, with his wonted sagacity and prodigality of learning, traces the several elements of the witch-creed to their roots in the beliefs of pagan times. Haas, *Die Hexenproeesse* (1865); Roskoff, *Geschichte des Teufels* (1869); Buckle, *History of Civilization* (1857-61); Lecky, *History of Rationalism* (1865); Tylor's *Primitive Culture* (1871), Conway, *Demonology and Devil Lore* (1878).

WITCH, or WYCH, ELM: the common broad-leaved elm (*Ulmus montanus*) of England and Scotland, which does not grow to so large dimensions as the field elm; nevertheless at Selborne, Gilbert White measured a witch elm which, 7 ft. from the ground, was 8 ft. in diameter. It is a tree of picturesque habit, and, unless grown in crowded masses, rarely produces a straight trunk. It has a wide, spreading head, often slanted to one side, and the branches begin near the base. These drooping branches lash neighboring trees unmercifully, and if they chance to rest on the ground readily strike root. The tree is easily increased by layers or by the abundant seeds. The timber of the witch elm is more durable than that of other English elms, but has their fine-grained, tough, and elastic qualities. It is very flexible when steamed, and is utilized for bent-wood work, frames in boat-building and bows; in olden times if the branches were forked, they served as divining-rods, perhaps because of the likeness in the broad, ovate leaves to that of the hazel, which is one of the so-called lightning plants. These plants are sacred to Thor, are considered to be an actual embodiment of lightning, and their forked branches (having, according to mythology, a resemblance to a lightning flash) are used as talismans to point out the hidden stores of gold or subterranean water.

WITCH'ES' SAB'BATH. See WITCHCRAFT, WALPURGIS-NIGHT.

WITCH-HAZEL: a tall, sometimes arborescent shrub (*Hamamelis Virginiana*) of eastern American woodlands. It has a characteristic horizontal, straggling growth; as Thoreau says: 'Its spray, so jointed and angular, is not to be mistaken for any other.' Witch-hazel is one of the

most difficult shrubs to eradicate from a clearing, as it has many diverging stems, so crooked and springy as to render axe-work unsuccessful. The bark is pale-gray, the leaves somewhat resembling the ovate foliage of *Corylus*, are more or less oblique, and undulate-edged, not at all handsome, but turning to a beautiful clear yellow in autumn. No sooner have they fallen off, with the rest of the forest foliage, in October or November, than the witch-hazels reclothe themselves with a luminous vesture of filmy, feathery yellow, which turns out to be the long delayed blossoms—whether the earliest or the latest flowers of the year botanists can not decide. Individually, they are not conspicuous, having only four narrow, strap-shaped, golden petals, but are tufted on the twigs as to gild the bushes. Meanwhile the fruits, little blunt, horned woody capsules that have been slowly ripening since the previous fall, begin to gape, and by elastic fissuring, and incurving their walls, shoot their stony-hard, bullet-shaped, polished seeds far and wide. Twigs of this witch-hazel, so unorthodox in its season of blooming, and remotely resembling the hazel-nut in foliage, were chosen as material for the forked divining-rods, which, twisting in the hand of the treasure-seeker, or well-digger, pointed downward and disclosed the site of subterranean water or gold. A much more practical use for witch-hazel has been found nowadays. An infusion of the leaves of witch-hazel in alcohol furnishes the familiar slightly astringent and tonic lotion for external inflammations known as 'witch-hazel' or 'hamamelis.' Branches of witch-hazel thrown into the fire exhale the characteristic, peculiar odor of the lotion. Both the foliage and bark, moreover, contain much tannin. The witch-elm of England is also called witch-hazel.

WITCH HILL: the name of a hill in Salem, Mass., so called because of the executions of witches which took place there in 1692. It is also known as Gallows Hill.

WITE, v. *wīt* [AS. *witan*, to censure]: in *OE.* and *Scot.*, to reproach: N. reproach; blame. WI'TING, imp. WI'TED, pp. WITELESS, a. *wīt'lĕs*, in *OE.*, blameless. Also spelled WYTE.

WITENAGEMOT, n. *wĭt'ē-nâ-gē-mōt'* [AS.—from *wita*, a wise man, and *gemot*, an assembly, a council]: among the *Anglo-Saxons*, the assembly of wise men; the supreme council or parliament of the nation, by which the king was guided in all his main acts of government. It was composed of the chief ecclesiastics, the ealdormen (see ANGLO SAXONS) of shires, and some of the chief proprietors of land. It appears, though the matter is not free from doubt, that the lesser thanes, who formed part of the *scir-gemót*, or next inferior court, were not entitled to form part of the general council. In 934 there were present at one of these assemblies King Athelstane, 4 Welsh princes, 2 archbishops, 17 bishops, 4 abbots, 12 dukes, and 52 thanes.

The powers of the Witenagemot seem to have been very extensive. The king's title, however hereditarily unexceptionable, was not considered complete without its recognition, and it possessed the power of deposing him. It could make new laws and treaties; and with the king it appointed prelates, regulated military and ecclesiastical affairs, and levied taxes. Without its consent the king had no power to raise forces by sea or by land. It was also the supreme court of justice, civil and criminal. The Witenagemot was abolished by William the Conqueror, and its powers were only in part transmitted to parliament.—See Hallam's *Middle Ages,* c. 8; Sir F. Palgrave's *Rise and Progress of the English Commonwealth;* Kemble's *Saxons in England.*

WITH, prep. *with* [AS. *with;* Icel. *vid;* Dan. *ved,* against, opposite, by: Ger. *wider,* against]: against, noting opposition, antagonism, or competition, as, to *with*stand the devil (that is, *stand against* or 'resist' the devil), to fight *with* the invader; in the company of, as, I went *with* him; in the society of, as, we spent a pleasant evening *with* our friends; on the side of, as, he that is not *with* me is against me, to vote *with* the opposition; in the possession of, or in the care, keeping, or service of, as, to leave a message *with* one, he is book-keeper *with* the John Smith Co.; wearing, bearing, having, or characterized by, as, the man *with* the hat; in regard to or in respect of, as, to have no patience *with* one; by, noting agent (torn to pieces *with* a bear: Shak., *W. T.,* V. 2, 68), instrument (as, to write *with* a pen), material, or ingredient (as, a ship laden *with* tin plates); in consequence of or on account of, as, to die *with* fright; from, indicating separation, etc., as, to differ *with* one, to part *with* one's last dollar; denoting connection, by denoting cause, instrument, or means.

WITH, pref. *with* [see above]: *with* as a prefix, except in the word *withal,* signifies opposition, privation, departure; from or against, as *with*stand (to stand against, resist); *with*hold (to hold back, retain); *with*draw (draw away, retire); etc.

WITH, n. *with.* See WITHE.

WITHAL, ad. *with-awl'* [*with,* together, and *all*]: at the same time; likewise; moreover; as well.

WITHDRAW, v. *with-draw'* [*with,* denoting opposition, and *draw*]: to draw away; to take back or away; to call back or away; to retire; to cause to retire. WITHDRAW'ING, imp. WITHDRAWN', pp. *-drawn'.* WITHDRAW'AL, n. *-draw'ăl,* the act of taking back; a recalling; retirement. WITHDRAW'ER, n. *-ẽr,* one who withdraws. WITHDRAW'MENT, n. *-mĕnt,* the act of withdrawing. WITHDRAW'ING-ROOM, a room for retiring into—now called *drawing-room;* the parlor or reception-room into which people withdraw after the repast in the dining-

room is finished.—SYN. of 'withdraw': to recede; remove; retreat; secede; go back; retrograde.

WITHE, n. *wĭth* or *wīth* [AS. *withig;* Icel. *vidir;* Dan. *vidie;* Ger. *weide,* an osier, a willow: Bav. *widen,* a band of twisted twigs: Lap. *wedde,* a tough twig for making baskets: comp. L. *viĕrĕ,* to twine; *vitis,* a vine]: a willow twig; a band consisting of tough flexible twigs, like those of the willow, twisted together; also spelled WITH, WYTHE. WITHED, a. *wĭtht* or *wīthd,* bound with a withe or withes. WITHY, a. *wĭth'ĭ or wīth'ĭ,* like a withe; flexible and tough: N. *wĭth'ĭ,* a large species of willow; a twig.

WITHER, v. *wĭth'ėr* [the same word as *weather—lit.,* to expose to the action of the weather, to fade]: to fade; to lose native freshness; pine away; to make to fade; to become sapless; to shrink or cause to shrink; to blight. WITH'ERING, imp. WITH'ERED, pp. *-ėrd:* ADJ. become dry; faded. WITH'EREDNESS, n. *-nĕs,* the state of being faded or shrivelled up. WITH'ERINGLY, ad. *-lĭ.*

WITHER, *wĭth'ėr,* GEORGE: English poet and satirist: 1588, June 11—1667, May 2; b. Bentforth, Hampshire. He was educated at the grammar school of Colemore, and afterward at Magdalen College, Oxford, which he entered 1604. He remained there several years, and, after passing some time at home, went to London, and entered himself at Lincoln's Inn. His bent, however, was to literature rather than to law; and he shortly became known in certain circles as a writer of clever verses. In 1613, he published a volume of satire, *Abuses Stript and Whipt,* certain things in which, however, were considered offensive, and he was sent to the Marshalsea prison. During his imprisonment were composed his *Satire to the Kings* and his *Shepherds' Hunting.* In 1622 appeared a collection of his poems under the title *Mistress of Philarete;* and 1635 his *Emblems, Ancient and Modern.* Though he had very much identified himself with the party of the Puritans, among whom his writings were most popular, on the breaking out of civil disturbance he served as a capt. of cavalry in the ill-judged and abortive expedition of Charles I. against the Scotch Covenanters, 1639. When a little later, however, the general discontent determined itself into the grand struggle between the king and the English parliament, he promptly sided with the latter, and raised a troop of horse for its service by the sale of his estate. In the army of the parliament he attained the rank of major; but of his special services not much is known. On one occasion he was taken prisoner, and is said to have owed his life to a joke of Sir John Denham, the poet, who besought the royalists to spare his life, on the ground that, so long as Wither lived, he (Denham) was not the worst poet in England. After the Restoration he was committed to the Tower and impeached as the reputed

author of a pamphlet, *Vox Vulgi*, of a so-called seditious tendency, and for a time his life seemed in danger, but the impeachment was not proceeded with and he obtained his liberty. He died in London.

Wither was a voluminous writer: more than 100 separate publications of his have been noted by modern bibliographers (see Park's *British Bibliographer*, vols. I., II.), yet after his death his poetry fell into oblivion, or was regarded with such contempt that we find him introduced by Pope in the *Dunciad* as 'wretched Withers.' A later time has revived this decision; the grace, sweetness, fancy, and charm of natural simplicity which distinguished his verse have since been sufficiently recognized. The men to whom chiefly the resuscitation of his fame is owing are Southey, Lamb, and Sir Egerton Brydges. In his *Shepherds' Hunting*, in particular, are passages of such rare and finished beauty that no collection of the choicest things in English poetry is complete without them. His *Hymns and Songs of the Church* were edited, with introduction, by Farr 1856. The best and most complete account of Wither's life and writings is in Wilmott's *Lives of the Sacred Poets* (Lond. 1834).

WITHERITE, n. *wĭth'ėr-īt* [after Dr. *Withering*]: carbonate of baryta, a mineral of a whitish or yellowish-gray color, occurring massive of a somewhat fibrous structure, or in distinct crystals—employed extensively in chemical works, in the manufacture of plate-glass, porcelain, etc., and used in France in the manufacture of beet-root sugar; also called BAROLITE.

WITHERS, n. plu. *wĭth'ėrz* [AS. *wither*, against: Ger. *widerrist*—from *wider*, against, and *rist*, an instep, an elevation]: the ridge between the shoulder-bones of a horse at the bottom of the neck and mane. WITH'ER-BAND, the piece of iron which unites and strengthens the bow of a saddle, over the withers. WITH'ER-WRUNG, a. injured in the withers. WITHERS UNWRUNG, uninjured on the withers; safe and sound.

WITHERSHINS, ad. *wĭth'ėr-shĭnz*, or WIDDERSHINS [from *wither*, against (see WITH), and *shins*, a corruption of *sun*]: literally, against the sun; in a direction contrary to the apparent motion of the sun; in the opposite direction; hence, in the wrong way.

WITHERSPOON, *wĭth'ėr-spôn*, JOHN, D.D.: clergyman, educator, and signer of the Declaration: 1722, Feb. 5—1794, Sept. 15; b. Gifford, Haddingtonshire, Scotland; descendant on his mother's side from John Knox. He was graduated at Edinburgh 1742; was ordained minister at Beith 1745; became noted for his ecclesiastical and doctrinal writings; was installed pastor at Paisley 1757, Jan. 16; and, after once declining 1766, accepted the presidency of the College of New Jersey at Princeton, and filled the office with great success from 1768, Aug 17, to his death. As an educator, besides teaching divin-

ity, he introduced in America the metaphysics of Reid, promoted the study of mathematics, of political science, and of international law, of Hebrew and of French, and made many improvements in educational methods. In the revolution he was a foremost leader, early described as being 'as high a son of liberty as any man in America.' He preached vigorously, 1776, May 17, in support of the patriot congress; was elected a member of the provincial congress of New Jersey, and opened its deliberations with prayer 1776, June 11; was elected, June 22, one of five representatives of New Jersey in the continental congress at Philadelphia; followed Adams (*pro*) and Dickinson (*con*) in the great debate of July 1, strenuously insisting on immediate declaration of independence; continued to 1783, except a short absence 1779-80, one of the leaders of congress, and was the initiator of many important measures and author of numerous state papers. His publications from 1753 were gathered into his *Works* (4-vols. 1801). His statue was set up at Philadelphia 1876, Oct. 20.

WITHHOLD, v. *with-hōld'* [*with*, against, and *hold*]: to restrain; to keep from action; to keep back; to refuse to grant, give up, or the like. WITHHOLD'ING, imp. WITHHELD', pt. pp. *-hĕld'*. WITHHOLD'EN, old pp. of *withhold, -hōld'n.* WITHHOLD'ER, n. *-ẽr*, one who withholds. WITHHOLD'MENT, n. *-mĕnt*, the act of keeping back or refusing.

WITHIN, prep. *with-ĭn'* [*with*, and *in*]: *in*, as opposed to *out;* in the limits or compass of; not beyond; in the inner parts of; indoors; not longer ago than; not further away than; not exceeding: AD. inwardly; internally; indoors.

WITHOUT, prep. *with-owt'* [*with*, and *out*]: not within; on the outside of; beyond; in a state of destitution or absence from; independent of; not in possession of: AD. not on the inside; out-of-doors; externally: CONJ. in *OE.*, unless; except. WITHOUT'EN, prep. *-owt'n*, OE. for WITHOUT. WITHOUT SIDE, ad. *-sīd*, in *OE.*, outside. WITHOUT PREJUDICE, a term used in cases of overtures and communications between parties to an action at law by which it is specified that should the negotiations fail to result in the adjustment of the controversy nothing that has transpired at such meetings will be taken advantage of at subsequent hearings before the court, but all will be regarded as 'without prejudice' to the matter at issue.

WITHROW, WILLIAM HENRY, D.D.: Canadian author; b. Toronto 1839. He was educated at Victoria College, Cobourg, and Toronto University, whence he graduated in 1863; admitted to Methodist University 1866 and from 1874 has been editor of the *Canadian Methodist Magazine* and Sunday School publications. His works include: *Worthies of Early Methodism* (1878); *The*

King's Messenger: or Lawrence Temple's Probation (1879); *The Romance of Missions* (1879); *The History of Canada* (1880); *Valeria: the Martyr of the Catacombs* (1880); *Neville Trueman, the Pioneer Preacher* (1880); *A Canadian in Europe* (1881); *Barbara Heck: A Story of the Founding of Upper Canada* (1882); *Men Worth Knowing: or Heroes of Christian Chivalry* (1882); *Life in a Parsonage* (1882); *Missionary Heroes* (1883); *Our Own Country* (1889, Edited); *China and its People* (1892); *The Native Races of North America* (1893); *A Harmony of the Gospels* (1894); *The Underground Railway* (1903).

WITHSTAND, v. *wĭth-stănd'* [*with*, against, and *stand*]: to oppose; to resist. WITHSTAND'ING, imp. WITHSTAND'ER, n. *-ėr*, one who or that which resists. WITHSTOOD', pt. pp. *-stûd'*.

WITH'Y, a. n. See WITHE.

WIT'LESS, WIT'LESSLY, etc. See WIT.

WITNESS, n. *wĭt'nĕs* [AS. *witnes*, testimony—from *witan*, to perceive, to know: OHG. *gewiznesse*, experience, testimony: Icel. *vitneskja*, intelligence, notice; *vitna*, to testify]: testimony; knowledge or matter adduced in proof; a person who is personally present and sees some occurrence or hears some remark or the like, and is therefore qualified to give evidence regarding it; one who gives evidence; one who sees the execution of a will, a deed, or the like, and subscribes his name to it to confirm its authenticity: V. to see or know by personal presence; to attest; to testify; to give testimony to; to give evidence; to see the execution of a deed and subscribe it: IMPERA. see, in evidence or proof—as, *witness* my hand. WIT'NESSER, n. *-ėr*, one who gives testimony. WIT'NESSING, imp. WIT'NESSED, pp. *-nĕst*. WITH A WITNESS, in *OE.*, effectually; to so great a degree as to leave a lasting mark.

WIT'NESS: a person in whose presence or under whose observation something has taken place, and who is therefore able to testify to what he knows of the matter at first hand; or one who testifies under oath, or who has been summoned or is capable of being summoned to give evidence by a court of law, or by some officer or body authorized to take evidence. A person who is called on to be present at some transaction, such as the making of a will, and who signs his name to some written instrument, is called an *attesting witness*. All persons of whatever nation are liable to be witnesses, and it is a duty which every citizen owes to his fellow-citizens to be available whenever his testimony is deemed desirable. The following persons however are incompetent: (1) Infants or persons so young as to be unable to oppreciate the nature and binding quality of an oath; (2) atheists and such as are insensible to the obligation of an oath from defect

of religious sentiment or belief; (3) idiots, lunatics, and intoxicated persons; and (4) infamous persons—i.e., persons convicted of treason, felony, *crimen falsi*, etc.; also, in general, husband and wife cannot be compelled to testify for or against each other. The usual mode, both in England and in the United States, of summoning a witness in a court of law is by serving him with a *Subpœna* (q.v.), reciting that a certain action is pending in a court named, and a trial is to take place, and commanding the witness to lay aside all and singular business and excuses, and appear at the time and place before the court mentioned, under a penalty (*sub pœnâ*). This is more fully called a *subpœna ad testificandum*. The corresponding term in Scotch law is Diligence (q.v.). If the witness is required to produce a document or documents in his possession, it is called a *subpœna duces tecum*, and he is told in the writ to bring the document. In general, all competent persons may be compelled to attend and testify, except, perhaps, experts who are to testify to their 'opinion' and not to fact. If a witness do not attend at the time and place mentioned, he is liable to be punished, either by attachment—i.e., summary imprisonment for contempt—or by an action for damages at the suit of the party summoning him. The subpœna, or notice to attend, must be served a reasonable time before the witness is wanted, and it is generally necessary to give a day's notice beforehand. During a witness's attendance on this public duty, he is privileged from arrest: thus, he cannot be taken into custody for debt while he is going to, remaining at, or returning from the court; and if a non-resident from another state be in attendance on a trial in a circuit court of the United States, he must be allowed a reasonable time after the disposition of the cause to enable him to return to his own state. Moreover, a witness is entitled, before he go to the court, to have his reasonable travelling expenses paid to him, and a sum for subsistence while he remains in attendance. He is also entitled to a reasonable allowance for his lost time while attending a civil trial. A witness may, in a civil case, but not in a criminal case, refuse to give evidence until his expenses are paid or a tender made. A witness, before examination, is required to take oath, which may be in any form which he considers most binding on his conscience. The testimony of witnesses is taken in three ways: by Affidavit (q.v.); by Deposition (q.v.); and by oral examination. When a witness is examined, he is generally asked specific questions, first, by the party calling him, and during this examination in chief the rule is that he is not to be asked leading questions—i.e., questions which suggest the answer desired. The opposite party is then allowed to cross-examine the witness, and in doing so may ask leading questions, or test in every way the truth of the witness's statement. After this the witness may be re-examined.

There is a technical rule that the party calling a witness is not allowed to impeach his credit, or ask anything having that effect. There are certain questions which a witness may refuse to answer. Such are questions the answer to which might render the witness liable to a criminal charge or penalty; but he cannot refuse if the effect would merely be to render him liable to a civil action, or merely to degrade him. If a witness live in a foreign country, or out of the state, or at a distance from the court, or if he is sick, or aged, or about to leave the state, or in cases where it would be impossible or very inconvenient for him to attend in person, the court may issue a commission to some person to take his deposition. In criminal cases, however, such depositions cannot be used without the consent of the defendant, in accordance with the constitution of the United States, that in all criminal prosecutions the accused shall enjoy the right to be confronted with the witnesses against him. Usually, when a witness is sworn, a New Testament is put in his hand, and after the officer of court repeats the form, the witness kisses the book. The form of words commonly is, 'You do swear that the evidence you shall give to the court and jury, touching the matter in question, shall be the truth, the whole truth, and nothing but the truth, so help you God.' When the witness is a Jew or foreigner, the form varies. In New England and New York the gospels are not generally used; the witness, when sworn, holding up his right hand, repeats the words above quoted, or, as in Scotland: 'I swear by Almighty God, as I shall answer to God at the great day of judgment, that I shall tell the truth, the whole truth, and nothing but the truth, in so far as I know or shall be asked.' A form that has been used in some notable cases is: 'I swear by the Living God to tell now and here the truth.' etc.

WITSNAPPER, n. *wĭt'snăp-pĕr* [*wit*, and *snap*]: in *OE.*, one who attempts repartee, but with indifferent success.

WITT. See De Witt.

WITTE, Sergei Yulievitch: *vĭt'tė-sirj'ô'lā-vĭch:* Russian statesman: b. Tiflis, 1849, July 29. After graduating from the Russian University at Odessa, he entered the service of a private railway in the province of Odessa, being rapidly promoted from freight clerk to traffic manager. While in this position during the war with Turkey he distinguished himself by his methods of handling troops sent to the front. In 1879 he secured a position on the Southwestern railway, became general manager of that road in 1886, in 1888 chief of the Government Railway Department, and subsequently Minister of Railways and chairman of the Tariff Commission. He was appointed Minister of Finance in 1892 and executed several commercial treaties with Germany, materially

aided the development of the manufacturing industries throughout the country, established the gold standard, and placed the sale of alcohol under government control. Soon afterward he was removed from the financial portfolio and made president of the committee of ministers or Imperial Chancellor. In the summer of 1905 the Czar appointed him one of the two plenipotentiaries to arrange a treaty of peace with Japan to put an end to the Russo-Japanese War (q.v.). In recognition of his services he was made a count by the Czar. In 1905, Oct., he persuaded the Czar to grant freedom of speech to the press and right of suffrage to all and was thereupon appointed premier of the empire. In 1906, May 2, he resigned the premiership and became a member of the Council of the Empire.

WITTEKIND, *wĭt'tĕh-kĭnd:* Westphalian chieftain, leader of the Saxons against Charles the Great: 8th c. He appears in history first in 774, as a leader in expeditions of the Saxons against the fortress of Eresberg, in Westphalia, and the Frankish province of Hesse, while Charles was subduing the Lombards. When most of the Saxon nobles submitted to Emperor Charles at the imperial diet at Paderborn 777, Wittekind fled to Siegfried, King of Jutland, whose sister Geva he is said to have married. In 778 he returned, and when Charles was absent in Spain began to lay waste the Rhine country. Charles's return forced him again to take refuge in Jutland, but 782 he fell upon the Frankish army by surprise at the Sintleberg, and annihilated it—an act which Charles avenged by the execution of 4,500 Saxons. On this, all the Saxon tribes rose in arms, and the war was again led by Wittekind until 785, when Charles entered into negotiations with him, the result of which was that Wittekind repaired to the emperor's camp at Attigny, in Champagne, and received baptism. After that he appears no more in history. According to the legend current in Westphalia, Charles promoted Wittekind to be Duke of the Saxons, and made over Engers to him. From his castle called Babilonie, in the neighborhood of Lübeck, he is said to have ruled with gentleness and justice till 807, when he met his death in a campaign against Duke Gerold of Swabia. His bones repose in the parish church of Engers, in the duchy of Ravensberg, where Charles IV. erected a monument to him 1377. Another monument in his honor was erected at Minden by the Westphalian Soc. 1812, Oct. 18. The higher of the two hills which form the Westphalian gates on the Weser, near Minden, bears the name of Wittekindsberg.

WITTENBERG, *vĭt'tĕn-bĕrch:* town of Prussian Saxony; on the Elbe; 55 m. s.w. of Berlin. Till 1873 it was a fortress of the third rank. It is interesting as having been capital of the electorate of Upper Saxony, as the cradle of the Reformation, and as containing the remains

of the Reformers Luther and Melanchthon. The famous university (founded 1502), in which Luther was professor, and mentioned by Shakespeare as the school where Hamlet studied, was incorporated with that of Halle, and removed, 1815, Apr. 12. In the *Stadt-Kirche* are two pictures, in one of which Melanchthon is represented as administering baptism, and Luther preaching to a congregation, of which the two foremost figures are his wife and son. In the *Scholoss-Kirche* are the tombs of Luther and Melanchthon, as well as those of Frederick the Wise (with a bronze statue by Vischer) and John, electors of Saxony. On the doors of this church—which were burned by the French, but replaced by others of metal—Luther nailed his 95 theses against the papal doctrine of indulgences. The house of the great Reformer, containing his chair, table, etc., and two portraits of him by Cranach, his friend and contemporary, remains almost unaltered. The houses of Melanchthon and Cranach also are shown. In the market-place is a bronze statue of Luther by Schadow, not far from which is also one of Melanchthon; and outside the Elster Gate a spot is pointed out as the place where in 1520 Luther burned the papal bull. Manufacturers of woolen and linen goods, hosiery, and leather, machinery and pottery are carried on. Brandy is distilled, and beer brewed.—Pop. (1900) 18,345.

WITTENBERG COLLEGE: at Springfield, O.; under the auspices of the Luth. Church; chartered and opened as a college 1845. The grounds comprise 40 acres at the highest point of the city. In 1874 the college was made co-educational, and one of the finest of its new buildings, Ferncliff Hall, is the woman's dormitory. The value of grounds and buildings is over $350,000; vols. in library, 12,000; value of scientific apparatus and library, $15,000; amount of productive funds, $200,000; total income $21,000; number of profs. and instructors 17; students about 380.

WITTICISM, WITTINESS, WITTY, WITTINGLY, etc. See WIT.

WITTOL, n. *wĭt'tŏl* [a corruption of *witwall,* one of the birds into the nests of which the cuckoo drops its eggs]: in *OE.,* a cuckold; one who winks at his wife's infidelity. WIT'TOLLY, ad. *-tŏl-lĭ,* in *OE.,* in a cuckold manner.

WITWAL, or WITWALL, n. *wĭt-wawl* [see WOODWALE, of which *witwal* is merely a form: Ger. *wittewal,* a yellow thrush]: a bird of a yellow or greenish-yellow color; the popinjay or green woodpecker; also called WODEWALE.

WITWATERSRAND, ('White Waters Range,' colloquially 'The Rand'): Transvaal, South Africa, a low range of hills extending 25 m. either side of Johannes-

burg, since 1886 famous as one of the richest gold-mining districts in the world.

WIV'ERN. See WYVERN.

WIVES, n. *wīvz:* plu. of WIFE (q.v.) WIVE, v. *wīv,* to provide with a wife; to marry. WI'VING, imp. WIVED, pp. *wīvd.* WIVE'HOOD, n. OE. for WIFEHOOD.

WIZARD, or rarely WISARD, n. *wĭz'ėrd* [from *wise,* signifying, in the language of the vulgar, 'the cunning man,' 'a conjurer']: an adept in the black-art; a magician; a sorcerer; a conjurer; in *OE.,* a wise or learned person: ADJ. enchanting; charming; enchanted. WIZ'ARDRY, n. *-ėrd-rĭ,* the practices of a wizard; magic.

WIZEN, a. *wĭz'n* [Icel. *visinn;* Dan. and Sw. *vissen,* dried up, withered; AS. *wisnian,* to become dry]: shrivelled; dried up: V. in *Scot.,* to wither; to dry up. WIZENING, imp. *wiz'n-ĭng.* WIZENED, pp. *wiz'nd:* ADJ. dried up; shrivelled. WIZ'EN-FACED, a. having a shrivelled thin face.

WO, or WOH, int. *wō:* an exclamation or cry to horses to make them stop: N. stop; check.

WOAD, n. *wōd* [AS. *waad;* Dut. *weede;* Ger. *waid;* F. *guède,* woad]: a plant of the genus *Isatis,* formerly extensively cultivated in Great Britain, for the blue dye extracted from its leaves, now superseded by indigo; the color extracted from it. WOAD'ED, a. colored or stained with woad.—*Woad* belongs to the natural order *Cruciferæ,* which contains only a few species, mostly natives of countries around the Mediterranean. DYER'S WOAD. (I. *tinctoria*) was formerly much cultivated in Great Britain for a blue dye obtained from its root-leaves. The use of this dye has nearly ceased, in consequence of the more general introduction and diminished cost of indigo. Dyer's Woad is a biennial plant, with oblong crenate root-leaves about 12 in. long on long stalks; upright, much-branched leafy stem about 3 ft. high; small yellow flowers, and large seed-vessels, about half an inch long and 2 in. wide, hanging from slender stalks. The leaves when cut are reduced to a paste, which is kept in heaps for about 15 days to ferment, and then formed into balls which are dried in the sun, and which have a rather agreeable smell and are of violet color within. These balls are subjected to a further fermentation before use by the dyer. When Woad is now used, it is always as a ferment in vats with indigo, which improves the color. Even by itself, however, it yields a good and very permanent blue. It is supposed that Woad was the dye used by the Picts for painting their persons.

WOBURN, *wō'bėrn,* local pron. *wô-bėrn:* town in Middlesex co., Mass.; on the Boston and Maine railroad; 10 m. n.n.w. of Boston. It contains the villages of North Woburn and East Woburn, connected by a street railroad, and has a bountiful supply of pure water from a

reservoir on Horn Pond Mountain. Woburn is a town of much business thrift. It was founded 1640, and has been noted for its manufactures of leather since 1673. The industry now has 35 establishments, which employ a capital of nearly $4,000,000 and more than 2,000 hands, pay more than $700,000 for wages and $4,000,000 for materials, and yield products valued at $6,000,000. Other manufactures are boot and shoe stock, glue, chemicals, electrical apparatus, steam-engines, machinery, foundry products, and pianos. Woburn has a number of churches, high school, Warren acad., graded schools, public libraries, nat. bank, savings bank, and a number of weekly periodicals.—Pop. (1890) 13,499; (1900) 14,254.

WODEN, an Anglo-Saxon deity, from whom *Wednesday*, the fourth day of the week, derives its name; see ODIN, which is the Norse form of the same name.

WODROW, *wûd'rō*, ROBERT: Scottish Presbyterian minister and church historian: 1679-1734, Mar. 21; b. Glasgow; second son of James W., professor of divinity in the Univ. of Glasgow. He was educated at the Univ. of Glasgow, and studied theology under his father. In 1703 he was licensed to preach, and was appointed minister of Eastwood, in Renfrewshire. In that parish he labored faithfully till his death, declining offers to more important pastoral charges. Soon after his settlement at Eastwood, he began a history of the Church of Scotland from the Restoration to the Revolution. He spared no pains and freely used his limited means in collecting materials for this work. He corresponded with all persons who could give him information, and transcribed with his own hand the civil and ecclesiastical records bearing on his subject. The work (2 vols. folio 1721-25) was dedicated to King George I.; and in 1725 he received an order on the Scottish exchequer for £105, as a mark of the royal bounty—probably his chief pecuniary recompense. A second edition of the history, 4 vols. 8vo. appeared at Glasgow 1828. *The Lives of the Scottish Reformers and most eminent Ministers* 2 vols., and *Analecta; or, a History of Remarkable Providences* 4 vols. have been printed by the Maitland Club. Wodrow's correspondence (3 vols.) has been pub. by the Wodrow Society. His great work—the history—is what it professes to be, a 'History of the Sufferings' of the Presbyterian Church, rather than an ecclesiastical history of the period. In this limited range it is of value to the student of Scottish history, as a storehouse of materials; but, in view of Wodrow's credulity and the fact that he could rarely admit a fault in those of his own side, there may well be question as to the credit to be given to his narration of facts. The fullest memoir of Wodrow is that prefixed by Dr. Burr in his edition of the history 1828.

WOE, int. *wō* [imitative of the deep-drawn breath of severe pain: Gr. *ouai;* L. *vae;* W. *gwae;* Dan. *vee;* Icel.

vei; Ger. *weh;* AS. *wá,* woe]: alas! an exclamation of pain or grief: N. grief; misery; a heavy calamity; distress; a curse; a denunciation of calamity. WOE'FUL, or WO'FUL, a. *-fûl,* distressed with grief or calamity; bringing distress or affliction; calamitous; wretched; miserable; paltry. WOE'FULLY, or WO'FULLY, ad. *-lĭ.* WOE'FULNESS, or WO'FULNESS, n. *-nĕs,* the state or quality of being woeful; misery; calamity. WOE'BEGONE, a. lost in woe; very sad; overwhelmed with grief or sorrow.

WOFFINGTON, MARGARET or PEG: British actress; b. Dublin, Ireland, 1720, Oct. 18; d. Teddington 1760, Mar. 28. She first appeared on the stage at 12 as Polly Peacham, with several other children, in *The Beggar's Opera,* but her first appearance in a mature part was as Ophelia in Dublin in 1737. From 17 to 20 she played on the Dublin stage all manner of parts, from Ophelia to Sir Harry Wildair, and in 1740, Nov. 6, made her first appearance at Covent Garden as Sylvia in the *Recruiting Officer.* She soon became a great success, the exquisite art of her male characters being especially remarkable. She kept the affection of the public till the tragic close of her career. In 1757, May 3, she broke down in playing *Rosalind,* and left the stage forever. Her character appears to advantage in Reade's novel *Peg Woffington,* and his play *Masks and Faces.*

WOF'FORD COLLEGE: located at Spartanburg, S. C. It was founded in 1851 under the control of the South Carolina Conference of the Methodist Episcopal Church, South, in accordance with the will of Benjamin Wofford, a minister of that church, who left a legacy of $100,000 to the conference for establishing a college. It was opened to students in 1854, and the sessions have never been entirely suspended, though during the Civil War the college suffered heavily, the endowment was rendered worthless, and full college work was not done. Since that time the college has been largely supported by the church, and the endowment partially restored, amounting to $100,000. Two preparatory schools have been established in connection with the college, the Wofford College Fitting School at Spartanburg, and the Carlisle Fitting School at Bamberg, S. C. The course in the former is three years; in the latter four years. The Carlisle school is co-educational. The college studies are arranged in four groups, or courses, the classical. the language-scientific, the scientific, and the Latin or Greek-modern language; each group includes a certain number of electives. The degree of A.B is conferred for the completion of any of these courses; and the degree of A.M. for graduate work. Instruction in methods of teaching and in school organization is included in the curriculum. Gymnasium work is required of all students. There are five loan funds and two scholarship funds. The students maintain two literary societies, member-

ship in one of which is compulsory; and a Christian Association which has been in existence over 20 years, and exercises an important influence on student life. The college campus comprises 70 acres; the buildings include the main building, the John B. Cleveland Science Hall, Alumni Hall, Archer Hall (a dormitory), residence cottages, the Wilbur E. Burnett gymnasium, and the fitting school. The library contains 8,000 volumes; the students at Spartanburg number 334.

WOHLGEMUTH, MICHAEL: German painter; b. Nuremberg 1434; d. there 1519. He was an eminent member of the Franconia school of German painting whose completest representative is Albert Dürer. The latter was indeed his pupil in the large studio or workshop where many branches of art were carried on by the master and a host of pupils and assistants. The occupations of this artistic association comprised altar-pieces, consisting of paintings, or wood carvings in high relief ablaze with color and gilt, such as abound in Spanish churches under the name of *retablos;* wood engraving, the blocks being cut from Wohlgemuth's designs, which were of supreme vigor and well adapted to the exigencies of printing from wood and easel paintings of portraits and history. Many paintings have been attributed to him which were evidently executed by the less skilful hands of pupils or assistants, but those whose authenticity is unquestionable are characterized by powerful drawing, rich and harmonious coloring and supreme delicacy of finish. His retable (1465), now in the Munich Gallery, is a remarkable masterpiece, and that which he furnished for the High Altar of Saint Mary at Zwickau gained for the painter much applause and the then princely sum of about $3,558. Another work of the same kind is to be found in Nuremberg Museum, having been originally painted for the churches of the Austin Friars at Nuremberg; his last retable was executed for the church at Swabach (1508). His fidelity and grace as a portrait painter are acknowledged by critics, who recognize in his realistic vigor and conscientious mastery of detail the best features of contemporaneous German painting. Two of his paintings, *Pilate Washing His Hands Before the People,* and a *Descent From the Cross,* are in the Royal Institution Gallery at Liverpool, but few works of this master are to be found elsewhere out of Germany.

WOJWODA, *woy-wō'da* (Polish, *Wojewoda*); also WAIVODE, *wā'vōd,* WAIWODE, *wā'wōd.* VAIVODE, *vā'vōd,* VOIVODE, *voy'vōd:* old Slavonic word [composed of *woi,* warrior, and *wodit,* to lead]: literally, army-leader or general; title of the elective princes of the Slavonic peoples before hereditary monarchies were formed, as in Walachia and Moldavia. From the Greek emperors, with whom these princes had been in intimate alliance from 1439, the princes next received the title Despot, after-

ward exchanged for that of Hospodar. The name Wojwoda was given also to the elective princes of Transylvania, dependent or independent, and was applied to the elective chiefs of the Polish govt. before the beginning of the Piast dynasty. Later the name denoted office and dignity, and was given, in the former kingdom of Poland, to the governors of the districts into which the kingdom was divided. They had at first only a military authority; afterward both the civil and military were united in one person, so that Wojwoda and 'Palatine' were one and the same. The name of Wojwodschaft (Vaivodeship) was preserved in Russian Poland till recent times; now the Polish Wojwodschafts are named uniformly with the other Russian 'governments.' From 1849 till 1860 the Banat (q.v.) and part of the military frontier constituted a separate Austrian crown-land, called 'the Servian Woiwodina and Temeser Banat.'

WOLCHOW, or VOLKHOV, *vōl-ċhov'*. See ILMEN; LADOGA, LAKE.

WOLCOT, *wûl'kot*, JOHN, M.D. (better known under the pseudonym *Peter Pindar*): English painter and satirist: 1738-1819, Jan. 14; b. Dodbrooke, Devonshire. He was educated at the charge of his uncle, a surgeon and apothecary of Fowey, Cornwall. After studying medicine at the London hospitals, he accompanied Sir William Trelawny to Jamaica as medical attendant 1769; but finding his professional income too small for his wants, he solicited and obtained a church living in the island. His congregation consisted mostly of negroes, and, Sunday being their principal holiday and market-day, the attendance at church was very limited. Sometimes not a single person came; and Wolcot and his clerk—the latter being an excellent shot—used at such times, after waiting for ten minutes, to proceed to the seaside, to enjoy the sport of shooting ring-tailed pigeons. The death of Trelawny, 1772, induced Wolcot to abandon both Jamaica and the priesthood. Returning to England, he tried to establish himself as a physician at Truro, in Cornwall, but does not appear to have succeeded. In 1779 he left Truro, and two years later removed to London, where he engaged in writing audacious squibs and satires in verse, on all sorts of persons, from King George III. down to the Liverymen of London, and lower. Wolcot is an exceedingly clever writer. Unscrupulous, impudent, and coarse, he is yet a master of burlesque humor and comic caricature: his verse is easy, vigorous, and idiomatic; and his fancy rich in ludicrous metaphor. Two of his raciest pieces were levelled at George III., 'the farmer king'—*The Apple-Dumplings and a King*, and *Whitbread's Brewery Visited by Their Majesties*, in the former of which the king is represented as wondering how the apples got into the apple-dumpling. Besides these may be mentioned *Lyrical Odes* on the Royal Acad. Exhibition (earliest of his Lon-

don efforts, 1782); *Bozzy and Piozzi, or the British Biographers; Peeps at St. James's; Epistle to a Fallen Minister; Odes to Mr. Paine;* and the *Lousiad, a Heroic-comic Poem,* in five cantos; etc. *Six Picturesque Views from Paintings by Peter Pindar, engraved by Alken,* appeared 1797. Some of Wolcot's serious effusions possess considerable merit. If the matter, or rather the themes of his verse, had been less worthless, it would have had better chance of permanent popularity. In his own lifetime his productions were eagerly read, and he had an annuity from the booksellers of £250 for the copyright of them. He was considered so formidable a personage that the ministry are said to have endeavored to bribe him into silence. Wolcot, who records this proof of his power, also asserts the incorruptibility of his patriotism. He died at Somers Town, London, and was buried at St. Paul's Covent-Garden.

WOLCOTT, Edward Oliver, ll.b.; 1848, Mar. 26—1905, Feb. 28; b. Longmeadow, Mass.: politician. He served as a private soldier (1864) in the 150th regt. Ohio volunteers. He afterward entered the class of 1870 at Yale, but did not graduate, though he received later the degree of a.m. In 1871 he graduated at Harvard law school. Removing to Colo., he there entered on the practice of law. Eventually he became interested in silver mining. In 1888 he was elected by the republicans to the U. S. senate, and re-elected 1894. Though favoring, as a bimetallist, the free coinage of silver, he supported McKinley in the campaign of 1896, against the free-silver republicans. In 1897 he was a member of a commission which visited Europe in the interest of bimetallism.

WOL'COTT, Oliver: successor of Alexander Hamilton as secretary of the treasury: 1760, Jan. 11—1833, June 1; b. Litchfield, Conn.; son of Gov. Oliver Wolcott. While student at Yale, he served in the Connecticut militia; after graduation 1778 he studied law in intervals of active military service; began practice in Hartford 1781; was financial clerk of the state and member of pay committee 1782; commissioner on state claims against the general government 1784; comptroller 1788; auditor of the United States treasury 1789, and its comptroller 1791, succeeding Hamilton as secretary of the treasury 1795, and resigning indignantly 1800, because a congressional committee did not exonerate him from base insinuations in regard to the burning of the treasury building. President Adams and the senate at once made him circuit judge, but the office was annulled by an act in 1802; after which Wolcott was a merchant in New York, and first pres. of the Bank of North Amer. ica 1812-14. Later he became governor of Connecticut, serving 1818-27, and presided at the constitutional convention. He died in New York, where his last years were spent.

WOL'COTT, OLIVER, LL.D.: signer of the Declaration of Independence: 1726, Nov. 26—1797, Dec. 1; b. Windsor, Conn.; son of Gov. Roger Wolcott. He graduated at Yale 1747; served as captain of the n. frontier in the French war; studied medicine; was sheriff of Litchfield co. 1751; member of the colonial council 1774-86; judge of the county court and of probate; commissioner of Indian affairs 1775; and was efficient in harmonizing the territorial disputes between Connecticut and Pennsylvania, and between New York and Vermont. The leaden statue of George III., on Bowling Green, New York, which the citizens overturned 1776, was removed to Gen. Wolcott's residence in Litchfield, Conn., where his daughters and their friends converted its material into cartridges for the militia. In 1776 Wolcott was member of congress, and, after the Declaration, as major-general he organized 14 regiments of Connecticut militia, and continued this work in 1777, largely reinforcing Gen. Putnam on the Hudson, and commanding a brigade in the operations against Burgoyne. He attended congress at intervals to the end of his term 1778. The next year he defended the Connecticut coast. He was again in congress 1780-84; as commissioner had part in the treaty with the Six Nations 1785; was lieutenant-governor of Connecticut 1786-96; and governor until his death, which occurred in Litchfield.

WOL'COTT, ROGER: colonial governor of Connecticut: 1679, Jan. 4—1767, May 17; b. Windsor, Conn. Apprenticed to the trade of weaver, he followed that business with success. He was a member of the colonial assembly 1709; commissary in the expedition to Canada 1711; member of the council 1714; county-court judge 1721; supreme-court judge 1732; and chief judge 1741, and deputy governor. As major-general he led the Connecticut forces in the Louisburg expedition 1745, and was governor of the colony 1750-54. He published *Poetical Meditations* (1725), including a description in verse of the visit of Gov. John Winthrop to Charles II. 1661; also, *The New England Congregational Churches Are and Always Have Been Consociated Churches* (1761).—His son, ERASTUS WOLCOTT, 1722-93, member and speaker of the Connecticut assembly, held several judicial offices; was colonel under Washington at Boston; brigadier-general 1777; engaged in several military expeditions; and subsequently was judge of the supreme court of Connecticut.

WOLCOTT, ROGER: American lawyer and governor: b. Boston 1847, July 13; d. there 1900, Dec. 21. Graduated from Harvard University in 1870 and from the law-school of the university in 1874, he was admitted in the latter year to the bar, but subsequently practiced little. In 1877-9 he was a member of the common council of Boston, and in 1882-5 of the Massachusetts house of representatives, where he gained a considerable reputa-

tion by his oratory and his activity in constructive politics and the furtherance of good government. He was sent as a delegate to the state republican convention in 1885, in 1887-9 was again a member of the Boston common council, and in 1891 was chosen first president of the newly-organized republican club of Massachusetts, in which post he rendered valuable service to his party. This was recognized by his nomination as lieutenant-governor. He was elected in 1893, served by re-election until 1896, and upon the death of Gov. F. T. Greenhalge in the latter year became acting governor. In November, 1896, he was elected governor by the largest plurality ever given in the state to a candidate for the office. In 1897 and 1898 he was re-elected. He declined the ambassadorship to Italy in 1899.

WOLD, n. *wōld* [Icel. *völlr*, a field, plain: O. Dan. *vold*, a field: Ger. *wald*, a wood]: a down hilly and void of wood; a plain or open country; same as WEALD (q.v.).

WOLD, n. *wōld:* a plant. See WELD 2.

WOLF, n. *wûlf* [Goth. *vulfs;* Icel. *ulfr:* Dan. *ulv;* Lith. *vilkas*, a wolf: allied to L. *lupus;* Gr. *lukos*, a wolf]: a fierce beast of prey to the dog kind; a term applied to any person who is ravenous and destructive; a small white worm infesting granaries; a tubercular disease, otherwise called *Lupus* (q.v.): plu. WOLVES, *wûlvz.* WOLF-DOG, large kind of dog used for hunting the wolf, formerly abundant in Norway and Sweden, but now found almost exclusively in Spain, into which it is supposed to have been introduced by the Goths. It belongs to the same group as the Shepherd's Dog, and is of large size, little inferior to the mastiff, with pointed nose, erect ears, lŏng silky hair, and a very bushy tail, curled over the back. In color it is mostly white, with large clouds of tawny color or brown. WOLFISH, a. *wûlf'ĭsh,* having the qualities or form of a wolf; rapacious; savage; ferocious. WOLF'ISHLY, ad. *-lĭ.* WOLF'ISHNESS, n. *-nĕs,* the state of being wolfish. WOLF-FISH, a ferocious fish (see SEA-WOLF, under SEA). TO KEEP THE WOLF FROM THE DOOR, to keep away poverty. TO CRY 'WOLF,' to give a false alarm.—The *Wolf* is a carnivorous quadruped belonging to the genus *Canis*, the same as that to which the dog belongs. It is doubtful if the different kinds of wolves found in different parts of the world are to be regarded as species or varieties, though they have, provisionally, received specific names. There exists among them the same close resemblance as in the different kinds of dog, with similarly marked distinction of characters, which, however, it is difficult to state as specific characters are generally stated. Wolves, in their most important characters, and those generally regarded as best marking specific distinction, agree not only with each other, but with dogs. The opinion that the wolf is the

parent of the dog, or of some kinds of dog, is favored by the identity of the period of gestation, an important point which seems established. Dogs and wolves also intermix, but it is not yet fully ascertained that the offspring continue fertile among themselves. It is further observed that wild races of dogs, whether originally wild or having become wild (*feral* races), resemble wolves in many respects—in their dull uniformity of color, in their lengthened muzzle, lengthened limbs, lank form, and gaunt aspect, and even in the bushiness of the tail. It has been alleged, as a reason against supposing the wolf and the dog to be of the same species, that the wolf is incapable of domestication and of attachment to man; but this is not the fact. Both the Common Wolf of the old world and the wolves of America have been found capable of domestication when taken young, and instances are on record of their having shown, like dogs, attachment to their master.

The COMMON WOLF (*Canis lupus*) inhabits Europe and n. Asia, its range extending from the Arctic regions as far s. as n. Africa and n. India. It is of yellowish or tawny-gray color; with strong coarse hair, longest on the ears, neck, shoulders, and haunches, but particularly on the throat; muzzle black, upper lip and chin white. The ears are erect and pointed; muzzle sharp; legs rather longer than those of the Shepherd's Dog; tail bushy, but not curling; eyes oblique, giving a peculiar vicious expression to the countenance. The wolf is swift of foot, and hunts deer and other animals, packs of wolves associating for this purpose; it also often commits great ravages among sheep; and attacks calves, but seldom full-grown oxen. It seldom attacks man, unless hard pressed by hunger. The hungry wolves which sometimes descend, in severe winters, from the forests of the Alps, Pyrenees, and other mountains, are much dreaded by the inhabitants of neighboring regions; and terrible stories are told of travellers chased by packs of wolves in the forest-covered plains of e. Europe, and in Spain. In general, the wolf is stealthy and cowardly, approaching sheepfolds and farm-buildings by night, in search of prey, but easily scared by any demonstration of watchfulness. It defends itself, however, with great vigor, when compelled to do so. It is not easily trapped, being extremely cautious, apparently understanding the nature and purpose of a trap almost as well as those by whom the trap is set.

Diversities appear in wolves of different countries of Europe and Asia. French wolves are generally browner and rather smaller than those of Germany; the wolves of Russia are larger, and have longer hair; the wolves of the Alps are brownish-gray and not large; in Italy and Turkey a tawny color predominates. In some far northern regions, wolves become white in winter; and white wolves, probably albinos, sometimes occur in more s.

regions. The Black Wolf is the most marked European variety: it is found in the Pyrenees and in Spain, and is very large and strong. Strings of mules are often followed by these wolves in the passes of the Pyrenees after evening comes on, and they frequently succeed in capturing some of the animals.

Wolves are still very plentiful in some parts of Europe. In the Pyrenees and Ardennes, among the Carpathian Mountains, in Turkey and the Principalities, they are common; and in the vast forests of Poland and Russia wolves often appear in formidable packs, and still cause much loss by their attacks on cattle, sheep, and horses. As cultivation increases, wolves become scarce. The wolf was formerly common in Great Britain, and the Anglo-Saxon name for January, *Wolf-month,* is significant of this fact. Places of refuge from wolves were erected for travellers in wild and unpeopled districts. King Edgar commuted the punishment of criminals on their producing a certain number of wolves' tongues. Lands in Derbyshire were held on condition of killing wolves. It is not easy to say at what date wolves ceased to exist in England; it was probably about the end of the 15th century; but they continued to commit serious ravages on flocks, in Scotland, in the end of the 16th century, and the last wolf in Scotland is said to have been killed 1743. In Ireland the last was seen 1770.

The American wolves are very similar to those of the old world, and are of the same species, though they have been described as forming several distinct species. The fur is thicker and the form more robust than in the Common Wolf, muzzle less pointed, profile not so straight, legs and ears shorter, and tail more bushy. The Gray Wolf (variety *occidentalis*), becoming whitish northward, is abundant in northern parts of North America, except in the long-settled districts, from which it has been expelled by man. It is the only kind found in Canada. A few are said still to remain in uninhabited mountainous and wooded parts of New England. Packs of wolves formerly followed the herds of buffaloes (bisons) on the western prairies, not daring to attack strong animals, but ready to seize any sickly straggler that fell behind the rest. They hunt and run down deer. The Gray Wolf equals the European species in cunning, and has been known to bite off the cord close to the trigger of a set gun, and afterward to devour in safety the bait placed before the muzzle. It has also been known to haul up fishing-lines set in a hole of the ice, and to help itself to the fish. It is frequently taken by means of pitfalls. On the prairies the Indians were in the habit of killing great numbers of wolves by inclosing them in a circle gradually reduced, but originally extending over many miles. In some parts of the United States a premium of $10 to $20 a head was formerly paid for the destruction of wolves, partly by the state, and partly by the county

or town, because of their ravages among sheep. The range of the Gray Wolf extends to the coldest n. regions, as Melville Island and Banks's Land. On the western plains the Gray Wolf gives place to the DUSKY WOLF (variety *nubilus*); in Florida is the BLACK WOLF (variety *ater*); and the RUFOUS WOLF (variety *rufus*) in Texas. They differ little in characters and habits from the Gray Wolf.—The PRAIRIE WOLF (*C. latrans*) or COYOTE, is a very different animal, more resembling the jackal. It is found from Mexico north to the Saskatchewan, abounding on the vast plains of the Missouri. It is 55 in. long, tail 11 in.; muzzle sharp and fox-like; ears very large and erect; four toes on each foot, and on the forefeet a sharp claw on the inside, 2 in. above the ground, attached to the rudimentary thumb; color usually dull yellowish-gray, with black cloudings, under parts dirty white. It hunts in packs. It is an extremely fleet animal, excelling every other in the countries which it inhabits, except the Prong-horn. Its voice is a kind of snapping bark. The true wolves never bark, the only sound that they emit being a prolonged and dismal howl.

South America has numerous species of *Canidæ*, some known as Aguana wolves and nearly allied to the Prairie Wolf.

WOLF, *volf*, FRIEDRICH AUGUST: the most gifted classical scholar and first critic of his times: 1759, Feb. 15—1824; b. Haynrode, near Nordhausen, Germany. He was brought up with great strictness by his father, leader of the choir and organist of the place; and was afterward sent to the gymnasium at Nordhausen, where were developed not only his restless ardor for thorough study of the ancient languages, but also the predominating trait of his character, the habit of inquiring and judging for himself, and of pursuing only one object at a time. Before leaving for the university, he had read the principal ancient authors, as well as the French, Italian, Spanish, and English; and had perfected himself in the theory and practice of music. At the University of Göttingen, which he entered 1777, with the intention of studying philology exclusively, he attended the lectures irregularly, being already much given to private study. He lived very retired, and was little visited or known. However, he gave lessons to several students in Greek, also in English, for which he published Shakespeare's *Macbeth*, with explanatory notes (Gött. 1778). From Heyne, who had once excluded him from hearing a course of lectures on Pindar, on account of the irregularity above noticed, he kept himself quite aloof. Yet, to commend himself to a man of so much influence as Heyne, he laid before him, shortly before his departure 1779, a dissertation containing some novel views regarding the Homeric poems; which, however, Heyne coldly returned. In the same year he went as teacher to the Pædagogium at Ilfeld,

and there first established his fame by an edition of the *Symposium* of Plato, with notes and introduction in German. In 1782 he became rector of the high school at Osterode, in the Harz; and 1783 professor of philosophy and of pedagogical science in Halle University. In Halle, Wolf gradually drew a crowd of eager pupils. As academical teacher, he went on the principle that classical antiquity should be regarded chiefly as serving for a model of what is noblest and greatest in public and private life. He made it the principal duty of his office to provide able teachers and superintendents for the schools of his native country, and to deliver education, as much as possible, from the prevalent scientific pedantry. Literary labors and fame he regarded as subordinate; and his effectiveness as a teacher was unparalleled during 23 years at Halle. He nevertheless established his reputation as scholar and critic by an edition of Demosthene's *Oratio adversus Leptinem* (1789); and still more by his famous *Prolegomena ad Homerum* (1795), in which he unfolded with prodigious learning and acuteness his bold theory that the *Odyssey* and *Iliad* are composed of numerous ballads or rhapsodies by different minstrels, strung together in a kind of unity by subsequent editors (see HOMER). This work made a great sensation throughout Europe. Some scholars gave out that they had long entertained similar notions regarding the Homeric poems; but Heyne insinuated that the Prolegomena were only a reproduction of what Wolf had heard at Göttingen. This gave rise to the spirited *Briefe an Heyne* (Letters to Heyne, Berl. 1797), of which the first three are models of scholarly polemic and fine irony. Some years afterward Wolf published the text of the four orations of Cicero, whose genuineness had been called in question by Markland in England—*Post reditum in Senatu, Ad Quirites post reditum, Pro domo sua ad pontifices, De haruspicum responsis*—appending the previous controversy, and adding striking observations of his own in proof of their spuriousness. He next attacked the authenticity of the oration *Pro Marcello*, which had long been studied by the Ciceronians as a model of eloquence and style, pronouncing it to be mere inflated declamation, in a diction hardly Latin, and which Cicero never could have written. This audacious skepticism produced no little alarm. After having refused a call 1796 to Leyden, 1798 to Copenhagen, and 1805 to Munich, his position was considerably improved, and he received the title privy-councilor. After the disasters of 1806 the university at Halle was dispersed, and Wolf was reduced to great straits; but he soon found a suitable position as member of the Academy of Sciences at Berlin, where he was active in reorganization of the university, and became a professor. He was taken into the ministry of the interior as member of the section for public instruction; but, finding that the duties inter-

fered with his time and strength for teaching, which he considered his mission, he continued only a short time in public office. He next gave up the work of an ordinary professor, and reserved at last only the privilege of lecturing in the university on selected subjects. He died at Marseilles, on a journey for health. The multitudinous works of Wolf we cannot attempt to enumerate: they consist chiefly of critical editions of classical writings, with dissertations and annotations, often with admirable translations in German or Latin. While in Berlin he edited, with Buttmann, the *Museum der Alterthumswissenschaften* (1807-10), and afterward the *Literarische Analecten* (1817-20), which has been pronounced perhaps the best philological journal ever published. From the papers which he left, his son-in-law, Körte, published *Ideen über Erziehung, Schule und Universität* (Ideas on Education, School and University, Quedlinb. 1835). See Hanhart, *Erinnerungen an Fr. Aug. Wolf* (Bas. 1825); Körte, *Leben und Studien Fr. Aug. Wolf's des Philologen* (2 vols. Essen 1833); Gottholdt, *Fr. Aug. Wolf die Philologen und die Gymnasien* (Königsb. 1843).

WOLF, Henry: American engraver: b. Eckwersheim, Alsace, 1852, Aug. 3. His artistic training was completed at Strasburg, and when he came to New York, about 1875, his ability soon made itself known. He exhibited at the Paris Salon in 1888 and 1895, winning a gold medal in the latter year; and at the World's Columbian Exposition of 1893 and the Paris Expositions of 1889 and 1900. His chief works are: *Engravings Illustrating American Artist Series*, and *Gilbert Stuart Series of Women and Men* in the *Century Magazine*.

WOLF, Hieronymus: German classical scholar: b. Göttingen 1516, Aug. 13; d. 1580, Aug. 10. From 1557 till his death he was director of a school at Augsburg. He was one of the foremost Greek scholars of his century and is held in remembrance for his carefully annotated editions, with Latin translations, of Isocrates (1570) and Demosthenes, as well as for editions of Byzantine historians and many other classical labors.

WOLF, Rudolf: Swiss astronomer: b. Fallanden, near Zürich, 1816, July 7; d. Zürich 1893, Dec. 6. He was teacher of mathematics and physics in the realschule at Berne 1839-55; and director of the observatory there in 1847. He was also professor of astronomy in the Bern University in 1853; professor of astronomy in the Polytechnikum and director of the observatory at Zürich in 1855, and later professor of mathematics and astronomy in the university there. He was famous for his investigations concerning the periodicity of sun spots and the accompanying magnetic variations, and wrote extensively on the history of science, especially astronomy. His *Astronomical Miscellany*, 1856-93, is a well-known series of papers, and his *History of Astronomy* (1877) is a standard work of reference.

WOLF, SIMON: American lawyer and communal worker: b. Hinzweiler, Bavaria, 1836, Oct. 28. A graduate of Ohio Law College, Cleveland, O., in 1861, he has since resided in Washington, D. C., where he served as recorder of deeds for the District of Columbia 1869-78. In 1881-2 he was United States minister to Egypt. While prominent in social and benevolent circles in Washington, he is identified with Jewish progress in America, was a founder of the B'nai B'rith Orphan Asylum at Atlanta, Ga., and for many years president of the Board of Delegates on Civil and Religious Rights of the Union of American Hebrew Congregations. In addition to various monographs, he has published *The American Jew as Patriot, Soldier, and Citizen* (1898).

WOLF: a river in Wisconsin; rises in the n.e. part of the state, flows generally s., passes through Pewaugan Lake, and enters the Fox river. Wolf river has been of great benefit in the development of the lumber industry in the n.e. part of the state. It is navigable for small steamers for about 150 m.

WOLF'BORO, N. H.: town in Carroll co.; on Lake Winnipiseogee, and on the Boston and Maine railroad; about 43 m. n.e. of Concord. It contains five villages. It has marble and granite works, boot and shoe factories, woolen mills, carriage and wagon works, flour mill, and lumber works. The town has five churches, graded schools, Brewster Academy, and a public library. The bank has a capital of $50,000. Pop. (1890) 3,020; (1900) 2,390; (1910) 2,224.

WOLFE, *wûlf*, CATHARINE LORILLARD: donor to benevolence: 1828, Mar. 28—1887, Apr. 4; b. in New York; daughter of John David Wolfe, the philanthropist, and granddaughter of Peter Lorillard. She inherited $10,000,000;and began with giving $100,000 per annum to benevolent objects, increasing the amount afterward to $250,000, distributed among various charities and institutions. Of her many gifts were $100,000 to Union College, $50,000 to found an Italian mission, $30,000 to St. Luke's Hospital, New York, a large amount for a newsboys' lodging-house, schools, colleges, and churches in various states, and the American School at Athens. She built Grace House, and to this and for improvements and endowment of Grace Church in New York she gave altogether $600,000. She built and endowed a diocesan house for the Protestant Episcopal diocese of New York, at an expense of $170,000. She sent William Hayes Ward, D.D., in charge of an archæological expedition to Asia Minor 1884. Her rich collection of paintings she bequeathed to the Metropolitan Museum, besides $200,000.

WOLFE, *wûlf*, CHARLES: 1791, Dec. 14—1823, Feb. 21; b. Dublin. He was educated at Winchester and at Dublin University. In 1817 his celebrated lines on *The*

Burial of Sir John Moore, suggested by reading Southey's impressive account of it in the *Edinburgh Annual Register,* were written; and so generally admired were they that even while the name of their author remained unknown they had won for themselves a secure place in the memory of the British people as a singularly felicitous and touching poetical record of a noble and pathetic incident in national history. Wolfe, after qualifying himself to take orders, became, 1817, curate of Ballyclog, in Tyrone, Ireland; and afterward of Donoughmore. His devotion to his duties was extreme, and overtaxed the strength of his constitution; and he died of consumption. His poems are now forgotten, except the one beautiful piece which preserves for us the name of Wolfe; this was attributed by guess, while he lived, to more than one of the most famous writers of the day—as. notably, Campbell and Byron.

WOLFE, JAMES: famous young English general, the hero of Quebec: 1727, Jan. 2—1759, Sept. 13; b. Westerham, in Kent. His father was a lieutenant-colonel, afterward Gen. Wolfe, an officer of merit and distinction, who served under Marlborough and Prince Eugene. From the first, the boy had resolved to follow his father's profession of arms; and when little more than 13 years old, he started to accompany the colonel as a volunteer in the unfortunate Carthagena expedition; but was prevented by illness. In 1742 he received his commission as ensign, and saw service in Flanders. In the year following he took part in the famous battle of Dettingen; and though still the merest boy, he acted in the responsible capacity of adjutant of his regiment. With the army in Scotland he served as brigade-major at the battles of Falkirk and Culloden. In 1747 he was again abroad on service. At the battle of Laufeldt he was wounded; and his conduct was so distinguished that he was publicly thanked by his commander-in-chief. He was in Scotland 1749-53, and showed admirable tact and discretion. In the mismanaged expedition against Rochefort 1757, Wolfe was appointed quartermaster-general of the force. The total failure of the operations brought disgrace to nearly all concerned; but it became sufficiently known that, had Wolfe's prompt and daring counsels been followed, the result would have almost certainly been different; and his reputation, already brilliant, was considerably enhanced. In particular, it appears that the attention of Pitt was now first decisively drawn to Wolfe; and marking approval of his conduct, the full rank of colonel was conferred on him. In 1758 he was intrusted with the command of a brigade in the expedition against Cape Breton, under Gen. Amherst; and the great success in the capture of Louisburg was attributed mainly to Wolfe's skill, boldness, and activity; so that he became known as the 'hero of Louisburg.' Pitt was now organizing his grand scheme for the expulsion of the

French from Canada; and the expedition, which had for its object the capture of Quebec, the enemy's capital, he confided to the care of Wolfe, allowing him, as far as possible, a *carte-blanche* for the choice of his subordinate officers. 1759, Feb. 17, Wolfe, now advanced to the rank of major-general, and commanding an army of between 8,000 and 9,000 men, set sail from England. June 26, Wolfe landed his forces on the Isle of Orleans, opposite Quebec, and proceeded to concert his plans for the attack on it. This, of which he had shortly before written as likely to be found 'a very *nice* operation,' proved, on closer examination, one of stupendous, indeed nearly hopeless, difficulty. The system of defense adopted by his adversary, the skilful and wary Montcalm, offered him no point of advantage. In all his attempts, though seconded ably by Admiral Saunders, who commanded the fleet, he found himself completely foiled. The season was wearing fast away during which operations could be continued; and an abortive result seemed imminent of the expedition from which so much had been hoped. But at last, at daydawn, Sept. 13, Wolfe stood, with his little army, on the Heights of Abraham, above the city, where Montcalm, sorely against his will, was forced to risk decision of the struggle by battle in the open field. Having resolved to stake all on a final effort, Wolfe had, during the night, succeeded in scaling the cliffs at a point insufficiently guarded—an operation of such frightful risk and difficulty as in war has had scarcely a parallel. Of victory he had no doubt: his little force, now—exclusive of detachments necessarily left behind—reduced to about 5,000 men, was indeed opposed to nearly 8,000 of the enemy, besides Indian auxiliaries; but of these it was well known that only a part could be depended on as trained and veteran troops. The result justified his confidence: after a short struggle the enemy was driven from the field in complete rout; the capitulation of Quebec followed a few days afterward; and its fall decided the fate of Canada. But Wolfe did not live to reap the fruits of his victory; he died in its very hour. In person he led the right; twice wounded, he refused to leave the front; a third bullet prostrated him; and he was carried, evidently dying, to the rear. He lived only long enough to know that the battle was decisively won; then rallying his last strength to give one final order, and saying, 'Now God be praised! I die in peace,' he expired, at the age of 33. The gallant Montcalm also fell, paying, with almost his last breath, the tribute of a true soldier to the valor of the troops who had defeated him.—The news of the victory was received in England with a tumult of exultation, dashed with grief for the loss of the hero to whom the nation owed it. When parliament met in November, the house of commons addressed the king, praying that his majesty would order a monument to be erected in Westminster Abbey to the

memory of the dead soldier, which was done. See *Life and Correspondence of Major-General James Wolfe,* by Robert Wright (1864); and *Montcalm and Wolfe,* by Francis Parkman (2 vols. 1885).

WOLFENBÜTTEL, *vol'fėn-büt'tėl:* very old town in the duchy of Brunswick; on both banks of the Oker; 7 m. s. of Brunswick by railway. Its old fortifications have been converted into promenades. There are several churches, schools, charities, and a college. In a handsome building modelled after the Pantheon at Rome was kept the famous library of which Lessing was librarian. In 1887, however, it was transferred to a new building in the Renaissance style. It consists of nearly 300,000 volumes and more than 10,000 manuscripts, and contains some of the finest missals in Europe, and an immense collection of Bibles, including Luther's Bible with autograph notes. Here also are preserved the great Reformer's marriage-ring, spoon, drinking-glass, and portrait of Cranach. The cultivation of vegetables is extensive, and there are manufactures of lacquered and japanned wares, paper-hangings, leather, tobacco, and liqueurs; and some trade in grain, cattle, and linen-yarn. Wolfenbuttel has five annual fairs. Pop. (1900) 17,873.

WOL'FENBÜT'TEL FRAG'MENTS. See Lessing; Reimarus.

WOLFF, Albert: German sculptor: b. Neustrelitz, Mecklenburg, 1814, Nov. 14; d. Berlin 1892, June 20. In 1831 he entered Rauch's studio in Berlin, and in 1844 was sent to Carrara to execute the sculptures for the terraces of the Sansouci palace. Upon his return from a sojourn in Italy of nearly two years, he assisted Rauch in the completion of the latter's Frederick the Great memorial for Berlin. In 1849 he became a member of the Berlin Academy, in 1858 professor there, and in 1866 a member of its senate. He was three times the victor in competitions for equestrian statues—in 1861 for that of King Ernest August (Hanover), in 1875 for that of King Frederick William III. (Berlin), and in 1885 for that of Gen. Artigas (Montevideo). Among his further works are busts of German notabilities, including von Moltke; a decorative bronze group, *The Lion-tamer,* for the Berlin Museum building; colossal statues of the *Four Evangelists* for the Schlosskirche, Neustrelitz; and other portrait and ideal productions.

WOLFF, Albert: French journalist: b. Cologne, Germany, 1835, Dec. 31; d. Paris 1891, Dec. 29. He studied at the University of Bonn, settled in Paris in 1857, where he became secretary to Alexandre Dumas, Père; and in 1859 began to contribute to the *Gaulois, Figaro, Charivari,* etc. Some of these articles, collected in book form, were afterward published as *Memoirs of the Boulevard* (1866); *The Two Emperors* (1871); *Victorien Sar-*

dou and Uncle Sam (1873); etc. He wrote also several novels and farces.

WOLFF, CHRISTIAN: German philosopher and mathematician: b. Breslau 1679, Jan. 24; d. Halle 1754, Apr. 9. He studied at Jena theology, mathematics, and philosophy, paying particular attention to the writings of Descartes and Tchirnhaussen, and writing an elucidatory commentary on the *Medicina Mentis* of the latter, which circumstance was the occasion of an intimacy between him and Leibnitz. In 1707 he was called to Halle as professor of mathematics. By his rationalistic views he here incurred the hostility of certain theologians who denounced him and by an order from the government of Frederick William I. he was commanded (1723) to resign his office, leave Halle in 24 hours and the Prussian states in two days. But he was ultimately vindicated and in 1740 appointed by Frederick II. vice-chancellor and professor in the University of Halle. Three years later he was made chancellor of that university. The principal service rendered by Wolff to the progress of learning consisted in his persistent application of mathematical methods to the investigations of physical science. The decided rationalism which characterized his philosophical doctrine resulted in a popularization of the Leibnitzian teaching. While appropriating many of the conceptions of Leibnitz he controverted his monadology, and regarded the theory of pre-existent harmonies as a mere hypothesis, while he asserted the possible interaction of body and soul. He followed Kant's *Critic of Pure Reason* in dividing philosophy into ontology, cosmology, rational psychology, and natural theology. His collected works make up 22 volumes.

WOLFF, EMIL: German sculptor: b. Berlin 1802, Mar. 2; d. Rome, Italy, 1879, Sept. 29. He was a pupil of his uncle, Gottfried Schadow, and having gained a prize at the Royal Academy of Arts, went to Italy in 1824 as a pensioner of Frederic William III., and ever after resided in Rome. He held high rank among German sculptors, and executed many Greek mythological and genre statues which have been greatly admired. In portraiture busts of Niebuhr, Thorwaldsen, Winckelmann and Bunsen are among his masterpieces.

WOLFF, JOSEPH: Anglo-German missionary: b. Weilersbach, near Bamberg, Germany, 1795; d. Isle Brewers, Somerset, 1862, May 2. He was the son of a rabbi, but became a Christian, taught Hebrew for a time at Frankfort and Halle, studied at Munich, Weimar, and Vienna, and in 1815 went to Rome. He entered first the Collegio Romano, and in 1817 the college of the propaganda, intending to become a missionary. Dismissed for heresy in 1818, he went to England, joined the English Church, spent two years at Cambridge, studying oriental languages, preparatory to going as a missionary to the

Jews in Palestine, and in April, 1812, embarked for Gibraltar. After an extensive tour in the east he returned to England in 1826. In 1827, he married Lady Georgiana Walpole, a daughter of the Earl of Orford, and in April of the same year set out on another missionary tour, and at Jerusalem was poisoned by some bigoted Jews and narrowly escaped death. On his recovery he set out for Bokhara by way of Persia and on the journey encountered the plague, was repeatedly robbed, was taken prisoner and sold as a slave, but finally reached Bokhara. He spent some time in Abyssinia, acquired the Amharic language, and returned to England in 1834. In January, 1836, he again visited Abyssinia, where he was worshipped by the natives as their new aboona or patriarch, visited the Rechabites of Yemen, met a party of Wahabees in the mountains of Arabia, who horsewhipped him because they could find nothing in the Arabic Bibles he had given them about Mohammed, and in August, 1837, came to New York. Here he received deacon's orders in the Protestant Episcopal Church, visited the principal cities, preached before congress, and in January, 1838, returned to England. He next visited Dublin, received priest's orders, and held several curacies in England. He went again to Bokhara in 1843 in the employ of the English government to obtain the release of Col. Stoddart or Capt. Connolly, but was imprisoned and saved from death only by the efforts of the Persian ambassador. He then returned to England in 1845, and after this eventful career spent the rest of his life in charge of the secluded parish of Isle Brewers, Somerset. He published: *Researches and Missionary Labors Among Jews and Mohammedans* (1835); *Journal of Missionary Labors* (1839); *A Narrative of a Mission to Bokhara* (1845); *Travels and Adventures,* an autobiography (1860); etc.

WOLFF, Julius: German poet and novelist: b. Ouedlinburg, in the Harz Mountains, 1834, Sept. 16. In 1869 he founded the *Harz News,* and in 1870-1 served in the German army and won the Iron Cross. He then settled in Berlin and devoted himself to literary work. His chief works are: *Aus dem Felde,* war poems (1871); *Tyll Eulenspiegel Redivivus* (1814, 23d ed. 1896); *The Rat-Catcher of Hameln* (1876); *The Wild Huntsman* (1877); *Tannhauser* (1880); *Lurlei* (1880); *Der fahrende Schüler* (1900); while among his novels may be cited *Der Sülfmeister* (1883); *Der Raubgraf* (1884); *Die Hohkönigsburg* (1902).

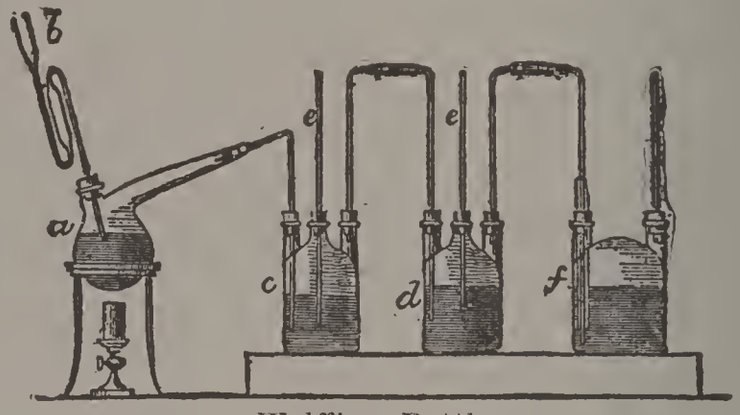
WOLFF, Oskar Ludwig Bernhard: German improvisator and novelist: b. Altona 1799, July 26; d. Jena 1851, Sept. 16. He studied medicine in Berlin and subsequently history and philosophy. He became professor of modern languages at Weimar, in 1826, and of modern languages and literature at Jena, in 1832. He published: *Pictures and Songs* (1840); *Natural History*

of the German Student (1841); *Bubbles and Dreams* (1844); *The Minor Ills of Human Life* (1846); *History of the Novel* (2d ed. 1850); etc., and edited: *Treasury of National Poetry* (4th ed. 1853); *Treasury of German Prose* (11th ed. 1875); *The German People's Treasury of Poetry* (28th ed. 1884).

WOLFFIAN BODIES: important organs in the vertebrate embryo, which serve only a temporary purpose, except in the lowest classes (fishes and Amphibia), in which they remain permanently. In the development of the chick, these bodies may be seen as early as the fourth day, lying along either side of the vertebral canal, from the region of the heart downward and backward, consisting of a series of tubules opening at one end into the body-cavity, and at the other into a longitudinal duct, the Wolffian duct, and corresponding with the so-called kidneys of fishes, which in reality are true persistent Wolffian bodies. On the fifth day the appendages become convoluted, and the body which they collectively form increases in mass. The appendages are then seen to possess a secreting property, and the fluid which they secrete is conveyed by the duct of each side into the urogenital sinus, into which opens also the *allantois*, a sack which, at the same time, acts as a temporary respiratory organ, and serves also as a urinary bladder; but atrophies in adult birds and mammals. Hence these organs may be regarded as temporary kidneys. In the chick, the true kidneys begin to form from the Wolffian bodies at the fifth or sixth day, and gradually increase in size as the temporary organs diminish; and at the end of fetal life, only a shrunken rudiment of those organs can be observed. In man the process is very similar, the Wolffian bodies beginning to appear toward the end of the first month; and in the seventh week the true kidneys first present themselves. From the beginning of the third month, the Wolffian bodies begin to decrease, the kidneys increasing in a corresponding ratio; and at the time of birth scarcely any traces of the former can be seen. It was formerly believed that the essential parts of the generative apparatus—the testes in the male and the ovaria in the female—also were developed from these bodies; but this is not the fact, as they have an independent origin in a special mass of blastema peculiar to themselves, in the immediate vicinity of the Wolffian bodies.

WOLFFIAN BOTTLES: set of apparatus used in distillation of Hydrochloric Acid (q.v.). It consists of a retort, *a*, in which chloride of sodium (common salt) is submitted to the action of sulphuric acid, gradually added through the funnel *b*, and the vapor evolved passes out into the first bottle (which, in the accompanying figure, is represented as half full of water), and is absorbed by the water. This process continues till the power of absorption of the water in the first bottle ceases

(in other words, till the water becomes *saturated*), when the vapor collects in the neck of the retort and in the tube *c*, till it acquires sufficient tension to force its way through the water, and enter the second bottle by the tube *d*. In turn, the water in the second bottle becomes saturated, after which the gas is forced to find its way into the third bottle through the other two by means of the connecting tube *f*. After the force of reaction in the retort has become weakened, the evolution of the gas is quickened by application of a flame, which should be gradually increased. Considerable heat being generated during absorption, it is desirable that the bottles should be immersed in cold water. The tubes *e*, *e* admit at-



Wolffian Bottles.

mospheric air to prevent the rarefaction in the retort tending to force the contents of the bottles back into it.

WOLFFIANISM, or WOLFIANISM, n. *wŭlf'ĭ-an-ĭzm:* in *philos.*, the system developed from Leibnitzianism by Christian Wolff. See WOLFF, JOHANN CHRISTIAN VON; LEIBNITZ.

WOLF'-FISH: fish of the genus *Anarrhichas* and family *Anarrhichadidæ*, having no ventral fins, pectorals very large, single dorsal fin extending from behind the head almost to the tail-fin, long anal fin, tail-fin rounded; head round, smooth, and blunt; teeth large and strong, not attached immediately to the jaws, but to bony processes connected with them by sutures. The jaws are powerful, the front teeth resemble the canine teeth of mammals, while the vomer and palate are furnished with teeth which have the form of rounded tubercles. One species, the COMMON WOLF-FISH, called also CAT-FISH and SEA-CAT (*A. lupus*), is found from Cape Cod n., also on the coast of Europe, and is plentiful in more northern seas. It is of light-gray color, brownish on the back; the lower parts exhibiting 9 to 12 dark transverse stripes continued on the dorsal fin; also dark spots and reticulations. The skin is covered with slime. It attains the length of 6 ft., and is of formidable and repulsive appearance: it bites savagely when caught, and fishermen generally dispatch it as soon as possible by knocking it

on the head. It preys chiefly on mollusks and crustaceans, which its jaws easily crush. It is often very destructive to nets, being active and powerful. Notwithstanding its ugliness, it is in esteem for the table, and is much used in Iceland, both fresh and salted; and a kind of shagreen, for bags and pouches, is made of its thick skin. In America it is used fresh, or split, salted, and smoked.

WOLFHOUND: a dog kept and trained for the pursuit of wolves. The ancient Irish wolfhound, now extinct, was of two kinds. One was a tall shaggy, swift-running dog, somewhat like the modern Scottish deerhound; the other more nearly resembled a mastiff, and similar dogs have been known in Spain under the name of wolf dogs. The modern Russian wolfhound is the beautiful borzoi.

WOLF'RAMITE: a native tungstate of iron and manganese in varying proportions, having the formula $(Fe,Mn)WO_4$. It occurs in flat, monoclinic crystals, with eminent cleavage parallel with the clinopinacoid. It is brittle, has a hardness of 5 to 5.5, and a specific gravity of 7.2 to 7.5, or about that of iron. It has a submetallic lustre, while it is almost or quite opaque and its color and streak are black or nearly black. It is thus distinguished from the closely related mineral hübnerite. It usually occurs in quartz veins, frequently associated with cassiterite or scheelite. It is of considerable commercial importance as a source of tungsten, the ferro-tungsten used in making tungsten steel being derived from it. Its best known localities are in Bohemia, Saxony, and England, but the recent increased demand for it has brought other localities into prominence, among which are those of New South Wales, Argentina, and Connecticut. Much so-called wolframite is really hübnerite.

WOLF'S-BANE. See ACONITE.

WOLF'S-FOOT: club moss. See *Lycopodiaceæ.*

WOLGAST, Germany: town of Pomerania, Prussia, on the left bank of the Peene; 4½ m. from its influx into the Baltic, and 40 m. s.e. of Stralsund by rail. Its harbor is shallow, and larger vessels load and unload on the Ruden, an island at the river mouth. Wolgast has the remains of an old castle, the ancestral seat of the Dukes of Pomerania. Its industries are weaving, boat building, and the manufacture of leather and tobacco. It has also an active trade in ships' stores. Wolgast, which was strongly fortified early in the 12th century, was destroyed in 1628 by Wallenstein, in 1630 by the Swedes, in 1637 by the Imperialists, and in 1638 again by the Swedes. In 1675 it was taken by the Great Elector, was plundered by the Russians in 1813, and by the Swedes again in 1715. But small remains now exist of its former fortifications. Pop. (1900) 8,251.

WOLLASTON LAKE, Canada: a lake of Athabasca,

in the Northwest Territory. It is about 50 m. long and has its outlet in the Mackenzie river.

WOLLASTON LAND, Canada: a region of Franklin territory, lying w. of Victoria Land, in the Arctic Ocean.

WOLLASTON, William Hyde: English chemist: b. East Dereham, Norfolk, 1766, Aug. 6; d. London 1828, Dec. 22. He was educated at Cambridge and was graduated in medicine in 1793. He practiced as a physician in Bury Saint Edmunds and then removed to London, where he presently devoted himself to scientific research, becoming secretary of the Royal Society in 1806, and its president in 1820. He was the inventor of the goniometer, an instrument for measuring the angles of crystals, and the discoverer of palladium and rhodium, in 1803, and the malleability of platinum, for which latter discovery he received the medal of the Royal Society in 1820 and which brought him $150,000.

WOLLASTONITE: one of the pyroxene group of minerals, crystallizing, therefore, in the monoclinic system. Its crystals are usually tabular, to which fact its name 'tabular spar' is due. Crystals are, however, rather rare, the common occurrences being compact or in aggregates of brittle fibres, having a splintery fracture. Its hardness is 4.5 to 5, and specific gravity 2.85. Its lustre is vitreous to pearly and its usual color is white or gray. Some localities yield specimens which show excellent triboluminescence. It is a calcium metasilicate, $CaSiO_3$. Its most important American localities are in northern New York. It was named in honor of the eminent English chemist, W. H. Wollaston.

WOLLIN, Germany: an island of Prussia at the mouth of the Oder; on the n. side of the Great Haff; length, 20 m.; breadth from 3 to 10 m. Fishing and cattle-rearing are the chief occupations. Pop. 14,000.

WOLSELEY, *wûlz-lĭ* (Garnet Joseph), Viscount, of Wolseley, K.P., G.C.B., G.C.M.G., etc.: British general, well known as Sir Garnet Wolseley: b. Dublin 1833, June 4; son of Major G. J. Wolseley. He entered the army as ensign 1852; served in the Burmese war 1852-3; was severely wounded in the Crimea, where he served with the 90th light infantry, and received the cross of the Legion of Honor and the fifth class of the Turkish order of Mejidieh, for his bravery there. He was in India during the Mutiny, at the siege and capture of Lucknow and the defense of Alum Bagh, and was made brevet lieutenant-colonel. In the Chinese war of 1860 Wolseley served on the staff of the quartermaster-general. Next year he went to Canada; successfully managed the Red river difficulty 1870, and was nominated a knight commander of the order of SS. Michael and George, and from that time was known as Sir Garnet Wolseley. On the outbreak of the Ashantee war, Wolseley was appointed to the command; and on his return, 1874, received the thanks of

parliament and a grant of £25,000 for 'courage, energy, and perseverance.' In 1875, become a major-general, he was dispatched to Natal to superintend the affairs of the colony; 1876 was nominated a member of the Indian council. In 1878, he was made high commissioner in Cyprus; and 1879 held supreme civil and military command in Natal, the Transvaal, and adjacent disturbed territories. He returned 1880, May, and became quartermaster-general at the headquarters of the army. In 1882 he became adjutant-general, and later in the year was commander-in-chief of the expedition to Egypt, for the successful conduct of which he received the thanks of parliament, was gazetted Baron Wolseley of Cairo, and of Wolseley in the county of Stafford, and had a large money-grant conferred on him. He was also promoted to the rank of general, and received from the khedive the grand cordon of the Osmanieh. In 1884-5 he conducted the operations for the relief of Gordon in Khartoum, for which he received the thanks of both houses of parliament, was made K.P., and raised to the dignity of Viscount Wolseley of Wolseley. In 1890, September, he succeeded Prince Edward of Saxe-Weimar as commander-in-chief of the forces in Ireland; in 1895 was made field marshal and commander-in-chief of the British army. Wolseley is the author of a novel, *Marley Castle* (1877); and of several essays and military handbooks also, *Memoirs of the Duke of Marlborough* (1894), and *The Decline and Fall of Napoleon* (1895).

WOLSEY, *wûl'zĭ*, THOMAS: cardinal and English statesman: about 1471-1530, Nov. 29; b. Ipswich, Suffolk, where, it is said, his father was a butcher. Though of humble origin, he received a good education, and at an unusually early age, he was sent to Magdalen College, Oxford, of which he became a fellow. It is said that while at Oxford he was brought into intimate relations with the great Erasmus, then in England. He afterward acted as tutor to the sons of the Marquis of Dorset, through whose favor he became rector of Lymington, in Somersetshire, 1500. On one occasion he appears to have fallen into difficulties. At a fair in the neighborhood, it was his misfortune, it is said, to be found drunk and disorderly; and by a certain knight of the shire, Sir Amias Poulet, he was put in the stocks for the misdemeanor. That he figured in the stocks is certain; but of the drunkenness there is no adequate evidence. When the power to retaliate came to him, he took his revenge on Sir Amias by having him imprisoned for six years.

In Somersetshire Wolsey became intimate with Sir John Nafant, through whose influence he was appointed chaplain to Henry VII., with whom he speedily ingratiated himself. Being sent by the king on a special embassy to the continent, he acquitted himself so dexterously that he rose still higher in favor; and 1508 the deanery of Lincoln was conferred on him. The next year

Henry VIII. succeeded to the throne. From this time forward the life of Wolsey is in effect the history of the England of which he implicitly became the ruler. From Henry he received unbounded favor and confidence; and his influence in the conduct of affairs was such as has seldom been exerted by a subject. The most valuable ecclesiastical preferments were showered on him; and finally, in the same year (1515), he obtained the bishopric of Lincoln and the archbishopric of York. The year following, the dignity of cardinal was conferred on him by the pope, who, not long afterward, appointed him legate also. Besides these ecclesiastical honors, he was made by the king his prime minister, and lord high chancellor of England. From this time (1515) till his forfeiture of the royal favor, Wolsey was one of the most important men in Europe, and in England his power was almost without limit. The revenues from his various offices were princely; and they were enlarged by subsidies from foreign potentates, eager to conciliate his favor. He did not bear his honors meekly; he affected a sumptuous magnificence, and a state almost royal, while his bearing was arrogant and imperious. He openly aspired to be pope; and more than once there seemed ground for supposing this crowning object of his ambition to be within his reach. It has been surmised that his resentment against Charles V., to whom he attributed his disappointment, determined, to a considerable extent, the foreign policy of the country.

Such a man could not fail to have many enemies, eager to discredit him with his royal master; and an occasion at length came. To the project on which the king had set his heart, of divorcing Queen Catharine and marrying Anne Boleyn, Wolsey showed himself hostile; of the latter part of the scheme he was known to disapprove; and his negotiations for securing the consent of the pope to the divorce seemed to the king dilatory and half-hearted. Henry, where his passions were interested, could not brook contumacy of this kind; his displeasure was carefully fanned, and the disgrace of Wolsey was accomplished. In 1529 he was stripped of all his honors, and driven with ignominy from the court. Symptoms of relenting showed themselves next year in the mind of the monarch; and it seemed as if Wolsey might again be taken into favor. The prospect proved delusive. Being at the time in Yorkshire, the archbishopric having been restored to him, with others of his minor preferments, he was arrested on a charge of high treason, and ordered to be conveyed to London for trial. On his journey he was attacked with dysentery, and died at Leicester Abbey.

The faults of Wolsey's character are great and obvious; but he was not without redeeming qualities. Haughty and insolent to his enemies and to those whose claims ran counter to his own, to his dependents and inferiors

he was generous and affable; and not a few of them showed their sense of this by devotion to him in his misfortunes. Of learning, he was a liberal and enlightened patron; and the endowment of Christ-Church College, Oxford, remains to attest this. He was a man of large and splendid capacity; and he seems, on the whole, to have been a diligent, faithful, and salutary counselor and servant of the monarch who so long and entirely trusted to him. His magnificent revenues were expended largely for national or state purposes. It has been said of Wolsey that he found the foreign policy of England insular, and left it European. Consult: *Life*, by Cavendish (1641); and *Lives*, by G. Howard (1824); C. Martin (1862); Williams, *Lives of the English Cardinals* (1868); *Brewer, Reign of Henry VIII.* (1884); Creighton, *Cardinal Wolsey* (1888); Gasquet, *The Eve of the Reformation* (1892); Gairdner, *The Fall of Cardinal Wolsey* in *Transactions of the Royal Historical Society* (1899); Taunton, *Cardinal Wolsey* (1900); and Gairdner's article in the *Dictionary of National Biography.*

WOLVERHAMPTON, *wûl-vĕr-hămp'tŏn:* England, a manufacturing town, the 'metropolis of the Black Country,' is built on an eminence amid a network of railways and canals, 13 m. n.w. of Birmingham, and 126 n.w. of London. The town stands on the western edge of the great coal and iron mining district of South Staffordshire, so that the vicinity on the s. and e. is covered with collieries, ironstone mines, blast furnaces, forges, iron foundries, and rolling mills, while on the n. and w. there is pleasant green country. It was first called 'Hamton,' and then 'Wulfrunishamton,' after Wulfruna, King Edgar's sister, had founded in 996 St. Peter's Church, which continued collegiate till 1846. Rebuilt during the 13th, 14th, and 15th centuries, and enlarged and elaborately restored. The church is a fine cruciform Gothic edifice, with several notable features and monuments. The other public buildings are all modern and include the town-hall, corn exchange, market-hall, agricultural hall, hospital, post-office, art gallery, drill-hall, etc. The free grammar-school, founded in 1512, occupies handsome new buildings of 1876; and there are also a blue-coat school (1710) and an orphanage (1850). In 1757 Wolverhampton was described as 'a great manufacturing town in all sorts of toys, and particularly of locks in the greatest perfection; locks—some 2,000,000 yearly—are still its specialty. The other manufactures include tin plate, japanned goods, enameled hollow wares, edge tools, gas and water tubes, electro-plate, papier-maché, chemicals, etc. Pop. (1901) 94,180.

WOLVERINE, Glutton, or Carcajou: a carnivorous mammal (*Gulo luscus*), of the weasel family (*Mustelidæ*), but differing greatly in appearance from the light and slender weasels typical of that family. The

wolverine is a short, thick, heavily built animal about 2½ ft. long, whose short legs, sub-plantigrade feet, and short, bushy tail add to a decidedly bear-like aspect of body. On the body and especially on the tail the hair is long, coarse, and rough, blackish brown with a pair of yellowish lateral bands meeting at the root of the tail above. The teeth are 38 in number and the molars are remarkable for their massiveness. The wolverine is a northern animal entering the United States only along the Canadian border, and even there very rare.

Apparently there is no distinction between the glutton of northern Europe and Asia and the American wolverine, and in both Old and New Worlds this brute is alike hated by woodsmen and trappers for its voracity, native meanness, and cunning. It has the reputation of being the most powerful mammal of its size in existence, and in dogged courage is said to have no equal. Those who have had experience with it place it ahead of even the coyote in craftiness and the ingenuity which it exhibits in finding and robbing the stores of man and beast. It systematically follows the lines of traps set by fur hunters and robs them of both baits and captured animals; but is itself one of the most difficult animals to take, and succeeds in repeatedly springing and robbing traps set for it, even when most cunningly concealed. Nor is its thieving confined to things edible; sometimes every portable article in a camp equipment will be carried away and hidden by a wolverine. It devours enormous quantities of food and its European name indicates that it is the type of greedy voracity. It lives on hares, squirrels, beavers, mice, foxes, all kinds of ground birds and their eggs, reptiles, insects, and even such large game as reindeer, which it is enabled to secure by its perseverance, great strength, and cunning. An expert tree-climber, the wolverine finds its most congenial home in the great northern forests, but its range extends beyond the tree line to the Arctic shores. Early spring is the mating season, and four or five young are born in June or July in a nest at the bottom of a burrow. The savage courage with which the female will defend her young is almost proverbial among trappers, who dread few animals so much as a mother wolverine with her family. Consult Coues, *Fur-bearing Animals* (Washington 1877).

WOLVERINE STATE: a popular name for the state of Michigan, so called for its abounding in early days with wolverines.

WOMAN, n. *wûm'ăn*, plu. WOMEN, *wĭm'ĕn* [OE. *wimmon;* AS. *wifman*, a woman—from AS. *wif*, a wife, and *man*, a person or being, the AS. *man* being of both genders (see WIFE and MAN)]: the female of the human race; a grown-up female; a female attendant: V. (with an indefinite *it*) to play the part of the woman; to act

timidly; to make one act timidly; to address as 'woman.' WOMANED, a. *wûm'ănd*, in *OE.*, accompanied by or united with a woman. WOM'ANHOOD, n. *-hûd*, the state or collective qualities of woman. WOM'ANISH, a. *-ĭsh*, having the qualities of a woman; effeminate. WOM'ANISHLY, ad. *-lĭ*. WOM'ANISHNESS, n. *-nĕs*, the state or quality of being womanish. WOM'ANKIND, n. *-kīnd*, the female sex; women collectively. WOM'ANLIKE, a. *-līk*, like a woman. WOM'ANLY, a. *-lĭ*, feminine; not masculine; suiting or becoming a woman; not childish: AD. in the manner of a woman. WOM'ANLINESS, n. *-nĕs*, the state or quality of being womanly. WOMAN'S RIGHTS: see WOMEN'S RIGHTS.

WOMAN'S CHRISTIAN TEMPERANCE UNION: a reform organization founded at Cleveland, Ohio, in 1874; it was the outcome of a woman's crusade against the liquor traffic in the middle states from 1870 to 1873. In 1903 the 'W. C. T. U.,' as the organization is popularly called, had regular associations in every state and territory, with over 10,000 local unions and a total membership of 500,000. An international association was founded in 1883 largely through the efforts of Frances E. Willard, and now has auxiliaries in 40 countries and provinces. The headquarters of the American association are at Evanston, Ill. The white ribbon is the general badge of the organization. The union has upward of 50 distinct departments of work, presided over by women experts in various lines. All the states except one have laws requiring the study of scientific temperance in the public schools, and all these laws were secured by the Woman's Christian Temperance Union; also the laws forbidding the sale of tobacco to minors. The first police matrons and most industrial homes for girls were secured through the efforts of this society, as were the refuges for erring women. Laws raising the age of consent and providing for better protection for women and girls have been enacted by many legislatures through the influence of the department for the promotion of social purity.

WOMEN'S COLLEGE OF BALTIMORE: this institution, situated in Baltimore, Md., was founded in 1884 by the Baltimore Conference of the Methodist Episcopal Church, as a memorial of the centennial of the organization of that church in the city of Baltimore, Dec. 1784. The board of trustees was incorporated in Jan. 1885 with the Rev. Bishop Edward G. Andrews as president. In Apr. 1890 the charter was amended and the powers of the corporation were enlarged. Building was begun immediately after incorporation and the doors were opened to students in Sep. 1888, under the presidency of William H. Hopkins, PH.D. In 1890 Dr. Hopkins resigned the presidency to take the chair of Latin, and the Rev. John Franklin Goucher, LL.D., was made president. President Goucher, in addition to his services to the institution, has been a large benefactor. The

principal building, named Goucher Hall, was his gift, and his total contribution amounts to nearly half a million.

The estimated value of the grounds, buildings, equipment and endowments is about a million and a half of dollars. Two buildings, one for instruction, and one for residence, have been assigned to the use of the Girls' Latin School of Baltimore, which is preparatory to the college.

WOMAN'S RELIEF CORPS: an organization created by the mothers, wives, daughters, and sisters of Union soldiers of the civil war of 1861-5, for the purpose of aiding and assisting the Grand Army of the Republic, and to 'perpetuate the memory of their heroic dead,' to 'extend needful aid to the widows and orphans,' to 'cherish and emulate the deeds of our army nurses.' In 1908 there were 3,119 corps and 158,366 members.

WOMB, n. *wôm* [Goth. *vamba;* AS. *wamb;* Dan. *vom;* Icel. *vömb,* belly, womb: Ger. *wamme,* dewlap; paunch: Dut. *wam,* the belly of a fish]: that part of an animal in which the young is conceived and nourished till birth; the place where anything is produced; any large, deep, or obscure cavity; in *OE.,* the belly: V. in *OE.,* to inclose; to breed in secret. WOMBED, a. *wômbd,* having a womb. WOMBY, a. *wôm'ĭ,* in *OE.,* capricious.—The *Womb* or

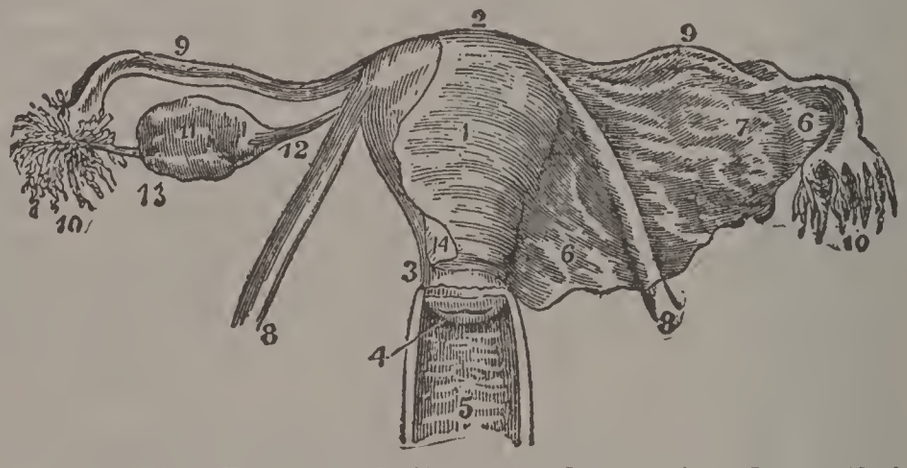


Fig. 1.—The Uterus and its appendages viewed on their anterior aspect:

1, the body of the uterus; 2, its fundus; 3, its cervix; 4, the os uteri; 5, the vagina laid open; 6, the broad ligaments of the uterus on left side; 7, a convexity of the broad ligament caused by the ovary; 8, 8, the round ligaments; 9, 9, the Fallopian tubes; 10, 10, their fimbriated extremities; 11, the right ovary; 12, the utero-ovarian ligament; 13, the Fallopio-ovarian ligament, on which some small fimbriæ are continued for a short distance; 14, peritoneum of anterior surface of uterus. The membrane is removed on the right side to show the parts imbedded in its folds.

Uterus is, in the human female, a flattened, pear-shaped organ, whose position and various parts are shown in fig. 1. It consists of a body (1), a base or fundus (2), a neck or cervix (3), and a mouth or *os uteri* (4). It

lies in the line of the axis of the outlet of the Pelvis (q.v.), with base directed upward and forward, and the neck directed slightly backward. (See fig. 2.) In its unimpregnated condition, which we are now considering, it is about 3 in. in length, 2 in breadth, and 1 in thickness, and weighs about an ounce and a half. On laying it open, or exploring its interior by introduction of an instrument through the *os uteri*, its cavity is found very narrow, and to contain a little mucus. Its walls are nearly half an inch thick, and are composed mainly of muscle-cells and fibres running irregularly in all directions except round the *os*, where they make a partial sphincter. This muscular coat, which constitutes the bulk of the organ, is covered externally with a serous coat, derived from the peritoneum, and is lined internally by a mucous coat continuous with that of the canal called the *vagina*, by which the interior of the womb communicates

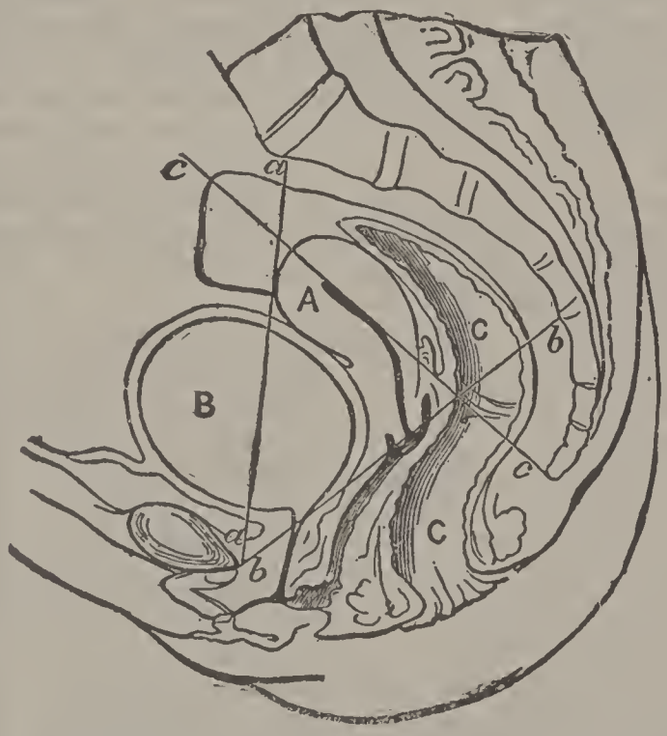


Fig. 2.—Section of Pelvic Viscera, with the parts in position:

A, the uterus; B, the bladder; C, the rectum (the latter two being moderately distended); *aa* is a line from the lower border of the symphysis pubis to the promontory of the sacrum; *bb*, from the same spot to the lower margin of the fourth sacral vertebra; *cc*, the axis of the uterus. When prolonged, it runs three-quarters of an inch in front of promontory of sacrum, and hits the end of the coccyx.

with the outer surface of the body. This mucous coat abounds in small mucous follicles and is provided with ciliated Epithelium (q.v.). The neck or *cervix* of the womb is distinguished from the body by a well-marked constriction. The mouth or *os* projects slightly into the vagina (which is shown as laid open anteriorly in the fig-

ure). This opening is nearly round in the virgin, and transverse after parturition. It is of considerable size and is named the *orificium uteri externum;* it leads into a narrow canal which terminates at the upper end of the *cervix* in a smaller opening, the *orificium internum,* beyond which is the shallow triangular cavity of the womb, of which it forms the lower angle, while the two upper angles, which are funnel-shaped, constitute the beginning of the Fallopian Tubes (q.v.), whose apertures are so small as to admit the passage of only a fine bristle. The blood-vessels and nerves enlarge in a very remarkable way during pregnancy, to adapt themselves to the increased wants of the organ, which, at the ninth month of utero-gestation, weighs from 2 to 4 lbs. The term *appendages to the uterus* is given to the Fallopian Tubes and Ovaries (q.v.), which are inclosed by the lateral folds of the peritoneum called the broad ligaments. The womb is suspended in the pelvic cavity in such a way as, by its mobility, to escape rude shocks from without, or disturbance from the varying conditions of the surrounding viscera, while allowing of its increasing in bulk with comparatively little discomfort when pregnancy occurs. This is effected by several duplicatures of peritoneum, containing variable quantities of fibrous and muscular tissue, and known from their form or connection as the *broad,* the *round,* the *utero-sacral,* and the *utero-vesical* ligaments.

The uterus is an organ peculiar to Mammalia, and in comparatively few of them (excepting the Apes and Cheiroptera) is it of the simple oval or triangular form above described. It is *two-horned* in the Ruminantia, Pachydermata, Solipedia, and Cetacea; and it is said to be *divided* where it has only a very short body, as in most of the Carnivora and Edentata, and some Rodentia, which speedily divides both externally and internally, and is continuous with the oviducts or Fallopian tubes. The uterus is *double* in some of the Edentata, and in most of the Rodentia, including the mouse and hare; in which each Fallopian tube passes into an intestiniform uterus, which has two completely distinct openings near each other within the vagina. In the Marsupiata and Monotremata the modifications of this organ are still more singular.

WOMB, Diseases and Derangement of the: ailments of the womb, especially in the pregnant or the puerperal state: for some of these, e.g., *Puerperal Fever* (q.v.). Many of these diseases may be traced to pregnancy, miscarriage, or severe delivery, occurring months previously. A common result of inflammation that often succeeds miscarriage or a bad delivery is to check that process of involution by which the womb ought to be restored in a few weeks to its size and condition previous to the pregnancy. When inflammation has once set in, interrupting these processes, even after it has passed

away, its effects may remain in the enlarged size and altered structure of the womb, changes which render it likely to suffer from the alternation of activity and repose to which the female generative system is liable. In this condition the enlarged and heavy uterus is very likely to become prolapsed, or to become a seat of permanent congestion or chronic inflammation; and excessive menstruation and a feeling of weight in the pelvis are almost always present. Besides this form of enlargement, there is a far less common form, in which the enlargement of the womb takes place independently of previous pregnancy, and is the result of true hypertrophy. The symptoms are, according to West, 'a sense of weight in the pelvis, pain usually of a burning character, hemorrhages having gradually come on, and forced themselves by their slowly increasing severity on the patient's notice.' The treatment is much the same in both these forms of enlargement—viz., rest and the use of potassium iodide, with possibly iron and ergot. There is also a form of hypertrophy which is confined to the neck of the womb, which occasions great discomfort to the patient. In these cases no relief can be afforded except by a surgical operation.

From these results of 'simple errors of nutrition,' leading to increased growth of the organ, we pass to the debatable and much-trodden ground of *inflammation of the womb*. *Acute inflammation* of the unimpregnated womb may arise from sudden suppression of the menstrual discharge, extensions of gonorrheal inflammation, etc.; but, as it is comparatively rare, we pass to an affection which was formerly regarded as one of the commonest—*chronic inflammation and ulceration* of the neck of the womb. A French physician, Recamier, invented an instrument—the speculum—for application of local remedies to the neck of the womb in cancer; but the light which this instrument threw on uterine conditions generally led to the conclusion that leucorrheal discharges (popularly known as *the whites*) were often derived from, and associated with, various morbid appearances of the mouth of the womb, and could often be removed by remedies directed to that part. Since uterine pain, disordered menstruation, and leucorrheal discharges—symptoms usually associated with ulceration of the mouth of the womb—are observed almost as frequently *without* as *with* ulceration, it may be fairly inferred that this ulceration is neither a general cause of uterine disease, nor a safe index of its progress; and though the local application of caustic to the *os uteri* is doubtless often successful in restoring the patient to health, it must not be considered as a general rule that the attempt, by local remedies, to remove this condition is the only point in the treatment of uterine disease. There is no doubt that, in the great majority of these cases, temporary separation from the husband's bed, the recumbent position, due

attention to the diet and state of the digestive organs, and the use of injections of a weak solution of nitrate of silver, are sufficient in a few weeks to effect a cure. Chronic uterine inflammation of more general nature (as of the interior or body of the womb), with very similar symptoms, is not rare. The disease in the acute form may require applications to the womb itself; in the usual chronic form, the pain in the back may be relieved by such liniment or plaster as the medical adviser will prescribe. The same remark applies to the irritability of the bladder, which is a common symptom, and usually associated with abundant phosphatic deposits in the urine. The tepid hip-bath may be used with benefit. The same general rules given above as to rest, diet, etc., must be observed. Under the best management, a tendency to relapse is liable to occur at each monthly period; and after several such relapses the womb is found to be enlarged and hardened, and less movable than natural. This condition is one which calls for treatment by the gynecologist. The profuse discharge—both menstrual and leucorrheal—is sometimes relieved by chalybeate preparations. A hip-bath, containing half a lb. of alum to every gallon of water, is often very useful as an astringent: it should be taken in the morning before dressing, and the patient should remain in it at least a quarter of an hour. For the first time or two, the water may have the chill just taken off. The same importance is not at present attached to vaginal injections as when it was believed that the vagina (and not the womb) was the main source of leucorrheal discharge. In a case of leucorrheal discharge of long standing, an excellent astringent injection may be formed by dissolving two drams of tannin and half an ounce of alum in a quart of water. Special forms of vaginal syringes are sold for this purpose. The application of caustics to the mouth of the womb must be left solely to the medical attendant.

We pass to a brief notice of the occasional *misplacements* of the womb. The singular mobility of this organ (without which pregnancy would be almost an impossibility) exposes it to the risk of displacement to such a degree as often to occasion great personal discomfort. As all the causes which tend to produce displacement (e.g., increased weight of the organ during pregnancy, pressure of the superincumbent viscera, etc.) act in a downward direction, the obvious tendency of the womb is to be thrown downward, or to suffer *Prolapsus* (q.v.), an effection which, in its extreme degree, when the organ is more or less protruded externally, is termed *Procidentia.* Causes sometimes come into action which incline the upper part of the uterus either backward or forward, giving rise to *retroversion* and *anteversion,* instead of mere prolapse. When the womb is not merely tilted forward or backward, but is bent upon itself, the

condition is called *retroflexion* or *anteflexion,* according as the organ is bent backward or forward.

The tendency of the womb to hypertrophy has been noticed at the beginning of this article; its individual tissues have a similar tendency to overgrowth at particular parts, giving rise to tumors or outgrowths, which are more common in this than in any other organ. Under this head are several varieties of *Polypus,* which differ essentially in structure, but all of which are invested by the mucous membrane which lines the uterus, and are liable to be the source of hemorrhage. Their removal by surgical means is generally not difficult. Much more important is the *Fibrous Tumor,* or *Fibroid,* which is frequent, serious in effects, and very slightly amenable to treatment. These tumors are of spherical form and firm texture, resembling that of the womb itself, and occur usually in groups; several being frequently present, while one or two are considerably larger than the others. The symptoms to which they give rise vary extremely, according as the chief tumor lies on the outer part of the womb, and grows into the abdominal cavity, or is developed within the walls of the womb, or projects into the interior. They may be of almost any size, cases being on record in which they weighed 70 to 80 lbs. In regard to the symptoms of this affection, it must be premised that sometimes these tumors exist without exciting any disturbance, and that growths on the outer surface give rise to comparatively unimportant derangements, compared with those which are imbedded in the walls, or occupy the cavity of the womb. It will be readily understood that women who have passed the change of life (as it is popularly called) suffer less from these tumors than younger women. The diagnosis of fibrous tumor is effected partly by manual and instrumental examination; and partly by the symptoms—such as (1) hemorrhage occurring in about 50 per cent. of cases independently of their nature; (2) disturbance of the menstrual discharge in 62 per cent. of cases, the discharge being usually excessive, and often painful; (3) pain, usually constant, and occasionally only at the menstrual period, described by some patients as a burning sensation, by others as a sense of bearing down, and by a few as occurring in paroxysms of intense agony; (4) dysuria—pain in voiding urine, a difficulty in discharging it, or frequent desire to pass it. It is usually hemorrhage or inability to void the urine that first directs the attention of the patient to her malady. Its tendency to excite abortion often leads the physician to suspect its presence. The treatment of uterine fibroids need not be described here, as it should always be described by the family physician or gynecologist.

We conclude with a few words on a disease—one of the most painful and hopeless of the disorders to which

humanity is liable—*cancer of the womb*. The three most constant symptoms are pain, hemorrhage, and discharge. In an examination of 132 cases the first symptom was found to have been,

In 58 instances, or 43.9 per cent., hemorrhage without pain.
In 26 instances, or 19.6 per cent., pain of various kinds.
In 18 instances, or 13.6 per cent., hemorrhage with pain.
In 18 instances, or 13.6 per cent., leucorrhea or other discharge without pain.
In 12 instances, or 10.3 per cent., pain and discharge, sometimes offensive.

The treatment is divisible into the *palliative* and the *curative*, the palliative being directed toward the three great symptoms, and the general symptoms of the cancerous cachexia (or constitutional state accompanying the local cancer); while in the curative is included the operation of extirpating the whole womb, or removing the neck of the womb by ligature or excision.—In certain cases careful attention to the bowels, abstention from meat, and the use of thyroid extract, and frequent douching with thuya, may effect a cure, but in early cases the consensus of medical opinion is in favor of complete extirpation of the uterus. It is difficult to speak with accuracy regarding the frequency of this disease: according to Tanchou, a French pathologist, cancer of the womb is more frequent than that of the female breast in the rate of 26 to 10. The same writer calculated, from ten years' observation of the French records of mortality, that this disease causes 16 per 1,000 of all female deaths. The disease is very rare before the 25th year, and by far the most common period of its appearance is between the ages of 40 and 50 years. Its average duration is 16 or 17 months, but it may prove fatal in 3 or 4 months.

WOMBAT, n. *wŏm'băt* or *wôm'ăt* [a corruption of the native name *wombach*]: an Australian marsupial burrowing mammal of the genus *Phascolomys*, constituting the family *Phascolomydæ*, abounding chiefly in mountainous districts of New South Wales, Victoria, Southern Australia, and Van Diemen's Land, and in the islands of Bass's Strait. In many of its characters, it resembles the *Rodentia*. The incisors are two in each jaw, long and chisel-like; they are hollow at the base, and continue to grow as they are worn away; there are no canine teeth; and the molars are five on each side in both jaws. There is a wide gap between the incisors and the molars. The wombat is an animal of clumsy form, having stout limbs and a blunt muzzle. It is 2 or 3 ft. long, plump, with thick coat of long, grayish brown, coarse, woolly hair; head large, flat, broad, with small eyes and ears, upper lip cleft; feet five-toed, claws long, except those of the inner toes of the hind feet; tail very short. It is plantigrade, and the soles of the feet are broad and naked. It is nocturnal in its habits, slow in its motions; feeds on

vegetable substances, and digs up roots with its claws; it makes its abode in holes among rocks, or in burrows dug by itself. It produces three or four young at a birth. It is a creature of little intelligence, but gentle, and easily domesticated to a certain extent, not seeming to care much for any change of circumstances, so long as its wants are supplied. It shows considerable snappishness, however, if provoked. Its flesh is preferred to that of any other quadruped of Australia. It is generally fat, and in flavor resembles pork.

WOMEN, n. *wĭm'ĕn:* plu. of WOMAN (q.v.).

WOMEN'S CLUBS, GENERAL FEDERATION OF: an organization incorporated in the United States in 1892, and composed of over 2,675 women's clubs, having a membership of 155,000 women in the United States and foreign countries. The purpose of federation is declared in its articles of incorporation to be 'to bring into communication with one another the various women's clubs throughout the world, that they may compare methods of work and become mutually helpful. Constitutions of clubs applying for membership should show that no sectarianism or political test is required, and, while the distinctively humanitarian movements may be recognized, their chief purpose is not philanthropic nor technical, but social, literary, artistic, or scientific culture.' Meetings of the federation are held biennially. There are 37 state federations auxiliary to the General Federation, and 683 single clubs in 41 states.

WOMEN'S RIGHTS: a political pseudonym used to express a movement for extending to women the same civil rights men enjoy. The origin of the movement is coeval with the effort to secure a civil expression of liberty and right among men, usually defined by the right to vote; the whole movement being a super-organic force operative in mankind for development and progress. It involves for men and women alike, freedom of thought, judgment and political expression of the same. It involves equity in law, testamentary and contractural privileges and all the principles of Magna Charta secured, England, 1215, June 15.

The dependent position of men was ever based on the motion that 'might makes right,' and likewise the dependent position of women, down through the different stages of civilization; even freedmen still holding, concerning women, the same oriental tenet from which repressive conditions they fought to be free. John Stuart Mill says that this is because 'the generality of the male sex cannot yet tolerate the idea of living with an equal.' This human obedience to the animal dominance over ethical nature in man is the perpetual ground of reform; and woman's rise above this dominance is just now a subject of general interest, demanding thoughtful attention. The question has not been launched into politics in

the United States in the form of civil demand, except in four states, Wyoming, Colorado, Utah and Idaho, where all theory concerning woman's civil citizenship has long since passed into experiment and actual history. To these states all arguments for woman's enfranchisement in the United States may turn for actual solution of the problem.

Roman law, which is the fundamental ground of all English common law, began the recognition of women under Emperor Calaudius (A.D. 41-54), who removed the tutelage of women of full age; and Emperor Justinian (527-565) abolished very many of the legal differences between the sexes and removed many restrictions bearing against family, wife, mother and nun. See JUSTINIAN CODE.

Later by several centuries, the canon laws opposed the Justinian laws concerning women, in every legitimate way setting up obstructions, and encouraging reversions which gave trend to woman's subjection through several centuries following. During these centuries only a few representative individuals of influence and power are found promoting the vital principle of regal personal force for freedom. And these were not always men; an 'Occasional Peer' among women is seen, as, for example, the Abbess Hilda, 664, presiding over the Synod of Whitby, a prerogative which no modern ecclesiastical body could adventure, according to canon. Elizabeth, Queen of England (1558-1603) not only exercised supreme civil authority, but was also the ecclesiastical head of the church, a notable exception to all precedent.

Going back to the origin of power for the church, Christ fulfilled His promise of empowerment for teaching and organizing disciples by sending the Spirit alike upon all of the waiting 120 men and women at Pentecost. This was the charter of power to evangelize the world. They all validated their vested authority by teaching, enrolling and baptizing 3,000 disciples that first day of Pentecost in Jerusalem; and that event is the legitimate basis, individual and plenary, of all ecclesiastical power for all time under Christianity.

The manner of expressing the universally accepted power of free personality of intelligent men and women is varied in different countries: and in each elicits a demand equivalent to the compass of responsibility. A democratic government resting directly on the basic intelligence of the people constitutes an imperative requirement from the conscious center of life and conduct commanding the periphery of politics. A full vote should be the free expression of the best thought, the vital center of the people's practical life. By so much as it is less than this, there is a violation of the intention of the democracy; and the entrepeneurs of civil government have not realized the scope of opportunity in responsi-

bility which the apparent conditions offered; the organum of betterment has not been attained.

In other words the conventional right to vote on all questions of civil interest is but one step in the right direction; it may be a long one or a short one in exact proportion to the moral codes of the organic movement; and also to the individualizing ability the vote brings with it to each constituent of state. If it is a power to sift and select and elect the best known representatives of the best principles of the voter, it is full power, based on the theory of freedom which enlarges the voter's being as applied to his relations among men; it becomes electorally interpreted by executive representatives, and practically, in laws of equity for all.

In England the form of civil expression is different, being more a matter of birthright and an electorate on property basis. There a woman is capable of holding almost any office of the kingdom if her birth and estate give the position. She may be queen, great chamberlain, constable of England, champion of England, keeper of the state house, keeper of the prison and other less important positions. Mary Sidney, Countess of Pembroke, was high sheriff of Westmoreland and exercised the office in person; sitting with the other judges at the assizes of Appleby. These facts of civil authority inhering in woman and being exercised in various official relations, hark back to the reign of Henry III. (1216-1272), when there were four women seated in parliament, and Queen Elleanor was lord chancelor, in the highest known court of the period; or under Edward I., when ten ladies were seated in parliament; or probably farther still, to the 'Martian statutes' of common jurisprudence traceable through the laws of Alfred the Great and Edward the Confessor, to Martia, known as Proba the Just, who wisely ruled in London many centuries previous; the desire for precedent being a human instinct in high as well as in low grades of mind.

The right of the British people to vote for members of parliament has been extended and restricted from time to time, resulting in a more democratic representation in the house of commons; but not granting to women the privilege of voting on the same basis as men electors in the counties and in the boroughs. The disuse of the custom formerly enjoyed by women is said to have been brought about by the violence of the struggles between the crown and parliament, the civil war and the commonwealth. It is claimed that the disqualification has never taken legal, or defensible form, and the movement for the enfranchisement of women is on the simple demand for recognition; their disfranchisement being a matter of usurpation of place and position by men who do not take the trouble to secure legal rights to women.

These premises are of such character as precludes any

exact data concerning the general application of 'Woman's Rights' as a political measure. The prerogatives of the movement are personal opportunity for civil expression of opinion at the hustings where political equality does give the thinking advocate an opportunity for self-expressioin which cannot be deputized to another; which cannot be successfully committed to a defender, or protector or other form of representative who must necessarily declare and vote his own opinion which virtually excludes his dependent. In this kind of representation the English women have had large freedom recently.

Organization for the securement of enfranchisement for women began in the United States in 1848, following as an independent corollary, the anti-slavery movement, in which women were very active. At a great meeting in New York city several women were elected as delegates with full powers to a convention to be held in London 1840, June 12. The ladies were rejected by the convention and required to listen from the gallery instead of occupying seats in the body to which they had legally certified. Two of the rejected delegates, Mrs. Lucretia Mott, of Philadelphia, a noted Quakeress of fine address, and Mrs. Elizabeth Cady Stanton, of New York, walking in Queen street, London, marveling at the inconsistency of the men, determined to organize a movement to change things as soon as they should return to 'God's country.' They organized at Seneca Falls, N. Y., 1848, July 19-20, with what result the world has heard, from the story of that first convention to the last recorded victory of parliamentary franchise in Australia. The greatest achievement of that convention was the acquisition of Susan B. Anthony, who became thenceforward the executive of the entire movement, giving her whole time to the propagation of the cause of women.

The arguments against the enfranchisement of women are numerous and worthy of record:

1. Men have always held rule over inferiors, through barbaric ages, through military governments, through oriental, monarchical, and republican governments of all history, constituting a masterful precedent for the continued rule of men.

2. Man's superior right is conceded in the masculinity of divinity, Ruler of the world.

3. The superiority of intellect in the larger form of brain is Nature's index of man's right to rule.

4. The greater strength of body and larger build of organism elect man to mastery.

5. Man's broader view of business and the material conquests of the country mark him for civic and financial leadership of affairs.

6. Political affairs are of unclean hands, unwashed garments, unsavory subjects, unwomanly methods, unsightly places, unkempt men of unholy propinquities;

altogether unsuitable for woman's presence and copartnership of duties and responsibilities.

7. Domestic harmony would be imperiled. Differences of political opinion, usually inherited, would become contentions or quarrels. Domestic duties would be neglected, children would suffer for need of attention and the usual regulations of well-ordered family life would be despoiled of its high rank as the accepted unit of state, if not utterly dissolved by the effort to enlarge the civil protosphere.

8. Women are fully represented in civics by their masculine friends and protectors, who not only police their interests, guard their femininity and decorum, but actually vote their opinions from absorption of their secret by 'the quiet influence.'

The preceding arguments against enfranchisement are answered by its advocates as follows:

1. The advocates of full enfranchisement do not deny that men ruled all in barbaric ages and military despotisms, but significant exceptions mark oriental history. The most highly civilized land, Egypt, was frequently ruled by a queen during that period of growth and culture which leaves the temple-lands a perpetual mine of research for archæologists. According to de Rouge, the pylons of Karnak reveal the occasional rule of woman from the second to the eighteenth dynasty. The omission of their history in more modern hieroglyphs, de Rouge thinks, is the result of the conquest by the Persians who regarded women with great contempt.

2. The second argument falls short of fact in the usual interpretation of the divine, which is spirit. In so far as humanity has any attributes, or elements of the Supreme Divine, it is in the ethical nature; it is without sex; it is spiritual. The Divine is a spirit of justice, of mercy, of life, of love. These attributes, known only by the elements which represent them in the best human character, are evinced in as clear-cut nature, strong personality and pure ethical conduct of women as of men.

3 and 4. As to superior intellect and larger brain, the latest word from science has answered with definite certainty that brain and intellect are sexless. While it is true that the state rests on a basis of force, physical or material, it is also true that government is maintained by the higher force of moral and mental character in its citizenship. The minority party does not acquiesce in the vote and voice of the majority because it acknowledges the superior physical force and feels measurably unarmed, or unmanned, but because of the principle of right incorporated in government to rule by federal majorities. It often happens that a federal majority is not an actual party majority throughout the states of the union; in which case the federal principle dominates the incumbency and dictates the policy of the administration.

The same is true in Great Britain, with a slightly different method of proroguing parliament and convoking expression of political opinion.

5. Man's broader view of business and his grasp of affairs are the result of broader education and contact with the people engaged in business. There is no method of educating to a broad view except the contact of mind, and no grasp of affairs without 'actual application of knowledge among the actuants.' There are not a few women prepared by similar process corroborating this fact by 'success in business.'

And men did not make all the material conquests of nature in North America. The pioneer women were their equal partners. The colonial woman was active in public affairs; Anna K. Greene did the colony printing and conducted the *Maryland Gazette* 1767-1773, when she died. Mrs. Mary K. Goddard published the *Maryland Journal,* and after the Revolution was the first postmaster for eight years. Clementia Ried published the *Virginia Gazette* 1772, favoring the colonial cause, and was the first to publish the *Declaration,* 1776, July 19, a synopsis having preceded in an earlier number. In Charleston, S. C., Mrs. Elizabeth Timothee published *The Gazette* 1773, and after the Revolution her daughter was made state printer till 1792. Penelope Russell conducted the *Censor* in Boston before and after the Revolution, setting her own type. Margaret Draper conducted the *Massachusetts Gazette and News Letter* through the British siege of Boston, and Mrs. Sarah Goddard made a very able paper of the *Newport Journal* (R. I.) during the hot contests of '76. *The Courant* (Hartford, Conn.) was ably edited at the same time by Mrs. Watson and till 1784, the time of her death. Another compeer was Mrs. Mary Holt, editor and publisher of the *New York Journal.* And there were very many others.

6. Political affairs are too pernicious, too uncanny for dainty women. Very true! But who will make conditions clean? If things go on in the corrupt manner described there will be an end of things at no distant period. Corruption is decay. Who will arrest it? Or who will rescue the dainty women from the general collapse when the corruption runs into blood-poisoning of the whole body politic? Who now associate closely with these very corrupt men when they are not voting? Surely no dainty women. Society would be destroyed by the contamination of contact with politicians 364 days in the year if it cannot bear the contact for one election day in the year.

7. However humble or exalted the domestic conditions, harmony is more dependent on the intelligent freedom to live out one's own personal life freely than on any other fact. Difference of opinions ought to exist in families, stimulating thought and conversation, with whatever of logic, sentiment, rhetoric or verbal distinc-

tions the partisans can command to win judgment of the others; conserving respect and elevating standards of personal dependency in various members of the family. Woman's desire for broader outlook and larger personality grows with the growth of civilization and cannot rest without useful prospect and enjoyment of the fruit of her activity. To repress this natural desire is to foster discontent. If woman can go quietly and deposit her opinion where it will count for her desired betterment in some family interest, or some state superintendence, or for the advancement of her legitimate profession, she realizes genuine contentment in having discharged a duty, met an obligation of reasonable requirement and has expressed herself. Every man understands this pleasure and feels himself an important factor in state. Woman likewise. See reports of state governors where full franchise is practiced.

8. A ballot represents the opinion of one person only. If a woman's husband or friend votes her opinion he forfeits his own; for only one is counted. It may be he has done better for the state by voting the woman's opinion, but if good, why not have had the two votes counted in the interest of general good?

The setting forth of the pros and cons of the subject of woman's enfranchisement will be stale and profitless matter to those who have passed through the history of the movement. It is easy to foresee that the civilized world is moving toward truer lines of sympathy which must introduce justice as a common factor of public life. Evidences of this increasing uplift are observable in the equal advantages of education for the sexes; in the renewing demand for higher grade teachers with better remuneration; in the open and growing demand for equal standards of morality, and all the virtues of purity and probity and personal dignity in men as well as women; in the increasing requirement for skilled service, and in the institutions for acquiring skill; in the numerous openings for women specialists in science, as mathematics, physics, chemistry, astronomy, civil engineering, architecture, archæology, mineralogy, graphic arts, plant and flower development, in all of which some women have achieved notable ends. Then, too, there is a rising recognition of woman's achievements, in the conferments of the honorary title of LL.D. The zeal with which women seized the recent opportunity for higher education reflects no uncertain light upon their powers of mind. Comparing women with men, which is never fair, but for convenient apprehension of facts, there seems but slight difference in the status of development. And yet for ages unnumbered men have had their seats of learning, while the oldest college with university powers for women was founded 1842 in Cincinnati, Ohio; and the oldest alumnæ association was organized by Mrs. Major Hitt, Washington, D. C., one of the earliest grad-

uates, 1852. Other schools of academic grade had done good work prior to that date, and among these was that of Cazenovia, N. Y., where was graduated the wife of Dr. Perlee Wilbur, the first president of the Cincinnati Woman's College, who defended the right and necessity for higher education for women. How clearly she won her case is manifest by the positions of learning women have taken, and by the rapid growth of great colleges, as Vassar, Wellesley, Smith, Bryn Mawr and many others of less note but equally efficient work; besides the universities that have opened their doors to women almost universally and are not ashamed of their output.

The question of granting parliamentary franchise to women in England was brought before the house of commons by John Stuart Mill as an amendment to a bill for representation of the people 1867, and has been rejected each year since that time with more or less advance in the movement. The principle of right for property holders to vote in election of representatives is conceded to be constitutional, but is held to be anomalous in the case of women who are represented, protected and even revered by their male relatives and impartially defended in all their interests. Evidently many English women of considerable rank do not agree to this view, and they have been petitioning and lobbying and soliciting by deputations the privilege of parliamentary franchise. This right was conferred upon all the women of Australia, about 800,000 in number, and nothing very startling resulted in that part of the British domain. Why not in the mother-land, the same rights? They point with envious contrast to the universal-suffrage ukase of 1906 given to the women of Finland, a depressed and struggling dependency under the czar of Russia, who at last responded to the long and earnest agitation of the women for parliamentary rights.

In Canada municipal suffrage is universally open to women, and in Ontario the only abridgment is in respect to legislature and parliament. In England, Scotland and Wales the status is the same as in Ontario. In Ireland women vote for city officers in Belfast, for harbor boards in seaports, and for poor-law guardians everywhere. In France women teachers can vote for members of councils of instruction. In Sweden suffrage is almost unlimited by sex, and in Russia woman's ballot is confined to heads of households. In Austria-Hungary women vote by proxy. In Italy widows vote for members of parliament; in Cape Colony, for municipal officers; in New Zealand, Australia and Finland full suffrage is granted for parliamentary elections.

In the United States full suffrage is enjoyed by women in four states, Wyoming, Colorado, Utah and Idaho; in the first since 1869, unanimously approved by constitutional convention, 1889, and with that constitution

Wyor became a state 1890. Colorado extended suffragewomen by legislative enactment 1893, and the womeote turned the scale against the gambling and saloonments of Denver 1897, much to the joy of the wholete. Numbers of women have been elected to the lature and the senate of that state. In Utah the terial constitution give suffrage to women, 1884. The inds law annulled the privilege 1887, but it was red by the constitution under which the state was ated into the Union 1890, and in that state also womee elected to the legislature and the state senate. Institutional amenlment, Idaho adopted woman suffraNov. 1896, and he governor's reports show admir results. By legislaive enactment, 1887, Kansas granteunicipal suffrage to women, since which time many councils have enoyed advantages of reform in thealler places, and a score or more of women mayorve been elected insmall cities. School suffrage has beranted in 23 stats. In Washington Territory womere voters many yers, until the adoption of the state citution raised thequestion of who should vote, and thpreme court of th territory decided that only men hhe right, and theprovision extending the vote to wo failed.

The stitution of New ersey framed 1776 made no restric of sex in suffrge, and an act passed 1893 expresecognized both sxes; this was repealed 1807.

Bibliphy.—The entiresubject in its various phases is foun three volumesof *History of Woman Suffrage* Stanton, Anthon and Gage; and a fourth volume*History of Womn Suffrage* by Susan B. Anthony, ding documentar data of value. The groundwork oe cause in right,n education, in industry, in social ion is laid dowby John Stuart Mill in various v.es. See also spches by Geo. W. Curtis before coutional conventi, Albany, N. Y., 1867, July 19; Hoideon Stewart, arren, Ohio, 1791, May 14; M. Mcn Brown, 'TheAccident of Sex,' Tremont Templeston, 1881, May7; also 'Institutive Powers,' before rnational Counc, Washington, D. C., 1888, Mar. 26o 'Problem of logress,' 1893, and 'Woman's Prerogas,' Toronto, 18, May. *Democracy As We Know I*906) and *Freedn's Conquest,* Hamilton Wilcox, givwide view of thrise of woman's power.

WON, *wŭn* [AS. *wuni,* to dwell (see WONT)]: in *OE.,* to ll; to live: N. *OE.,* a dwelling; a habitation. WING, imp. WONED, pp. *wŭnd.*

WONDER, n. *wŭn'dẽr* [S. *wundor;* Dut. *wonder,* a wonder: l. *undra;* AS.*wundrian;* OHG. *wunteron;* Ger. *wun,* to wonder]: urprise caused by something new, str, or unexpecte which at the moment appears incable; a wordhich expresses less emotion than *astement,* and grtly less than *amazement;* a thing whxcites surprisa strange thing; a prodigy;

a miracle: V. to be struck with surprise or s astonishment; to feel doubt and curiosity, as, *wonder* whether he will be in time.' WON'DERING, .: ADJ. indulging or feeling wonder. WON'DERED, *-dėrd.* WON'DERER, n. *-dėr-ėr,* one who wonders. WOIFUL, a. *-fûl,* adapted to excite wonder or admiratiexciting surprise; astonishing; marvelous; surprisiremarkable. WON'DERFULLY, ad. *-lĭ,* in a manner to te wonder or surprise. WON'DERFULNESS, n. *-nĕs,* tate or quality of being wonderful. WON'DERINGad. *-lĭ.* WON'DERMENT, n. *-mĕnt,* suprise; astonishm WON'DROUS, a. *-drŭs,* of a kind or degree to excurprise and astonishment; strange; marvelous. WROUSLY, ad. *lĭ,* in a strange manner; to a strange de; WON'DROUSNESS, n. *-nĕs,* the quality of beingndrous. WON'DER-STRUCK, a. struck with wonder urprise. WON'DER-WORKING, a. accomlishing wonders

WONGSHY, or WONGSKY, n.: erroneousrms of WONGCHI, *wŏng-chē* or HVANG-CHI, *hwŏr* Chinese name for the seeds of plants *Gardenia florib* and *G. radicans,* which yield a yelow dye. The aus solution of wongchi colors wooland silk withoordants; cotton must first be mordated with a soli of tin. When roasted the seeds ofthe *chi* are ca *Hĕh,* or black chi, and are exhibited n fevers. [The e *Wongchi* is from *hwang,* yellow, ad *chi,* a plant ie genus *Gardenia.*].

WONSAN, Korea: a trety-port on the oast, on Broughton Bay, 115 m. n. y e. of Seoul. old-mine is worked here. Pop. 15,00.

WON'T, *wōnt:* contractin of woll not, obsolete form of *will not.*

WON'T, n. *wŭnt* [AS. *wnian;* Ger. *wohn* to dwell, continue in: Icel. *vani,* custom, use: O *giwona,* usage]: custom; use; habit ADJ. used orustomed: V. in *OE.,* to be accustomd. WONT'ED, a.ustomed; usual. WONT'EDNESS, n. *-nė* the state of b wonted. WONT'LESS, a. unaccustome; unusual.

WOO, v. *wô* [AS. *wogian* to woo—from *woh,* bent —*lŭt.,* to bend; to incline]: o make love to court; to seek, as a wife; to invitevith importun WOO'ING, imp. WOO'INGLY, ad. *-lĭ.* WOOED, pp. *wôd* WOOER, n. *wô'ėr,* one who wooes; onevho seeks to gthe favor or love of a woman with aiew to marriag suitor.

WOO-CHANG, *wô-châng* city of Chinrovince of Hoo-pe, and the seat of ie viceroy of -nan and Hoo-pe; on the Yang-tse-kig river, at thlux of the Han-kiang, and nearly opsite the greater-port of Hankow; 600 m. w. of Shghai, and abo50 m. s.w. of Nanking. Woo-chang is fine walled noted for its learning, and for its mufactures intals.—Pop. not definitely known, but s than one mn.

WOOD *wûd* [AS. *wudu;* Dan. and Sw. *ved*, wood: W. *gwy*trees, shrubs: Gael. *fiodh*, timber]: a large collectio growing trees; the solid fibrous part of a tree lyinelow the bark (see WOOD and WOODY FIBRE, below); s fit for use in building, etc., either standing or cown and cut into pieces suitable for various purposesmber: ADJ. pertaining to a wood or woods; made ofod: V. to supply with growing trees or wood; to be sued with wood. WOOD'ING, imp. WOOD'ED, pp.: ADJ. sued or covered with wood or growing trees. WOODEN *wûd'n*, made of wood; consisting of or resemblingod; clumsy; senseless; awkward. WOOD'Y, a. *-ĭ*, abou g with wood or trees; resembling wood; of the natof wood; ligneous. WOOD'INESS, n. *-nĕs*, the state ordity of being woody. WOOD'LAND, n. land on which trare allowed to grow: ADJ. relating to woods. WOOD'LESS, a. *-lĕs*, having no woods or large collections of treesWOOD'BINE, n. *-bīn*, or WOOD'BIND, n. *-bīnd* [*wood, bind*]: the Honeysuckle—so called because it binds orcircles like a band; the *Caprifolium periclymenum*, f. *Caprifoliāceæ;* also, in the *United States*, the Viia creeper, *Ampelopsis quinquefolia* (see VITACEÆ). WOOD-COAL, lignite or brown-coal, in allusion to its wy texture, which is often as distinct and well preserves in recent timber. WOOD-CUT, an engraving on wood print or impression from such an engraving. WOOD-CUR, one who fells trees or who cuts wood; an engraven wood. WOOD-CUTTING, the art or employment ofting wood by saws, etc.; wood-engraving. WOOD-ENVER, one who engraves on wood. WOOD-ENGRAVING, e art of cutting designs in relief on wood, so that pressions on paper or some similar material cbe made from them in a printing-press (see belo; an engraving on wood. WOOD-FRETTER, n. *-frĕt'tĕr ood*, and *fret*]: an insect that burrows in wood. Wo-LARK, a species of lark found near the borders of ds; *Alauda arborea*. WOOD-LOUSE, a flattish crustaceaf a slate-color, having many feet, inhabiting cellars, gens, old walls, and moist places; an *oniscus* (see belo; the familiar name of a small white insect found inaying wood; also called a *wood-mite*. WOOD'MAN, ondho fells trees; a forester; in *OE.*, a huntsman. W-MEASURER, in *Scotland*, a lumber-merchant. WOOD-MEIANT, a lumber-merchant; one who sells firewood. Wo-MITE: see WOOD-LOUSE. WOOD-NOTE, wild music; thusic of forest birds. WOOD-NYMPH, in *anc. myth.*, a ldess of the woods. WOOD-OPAL, a variety of opal, or ılized wood, in which the form and texture of the w are still distinctly visible. WOOD-PAVEMENT, a pavem consisting of blocks of wood instead of stones. Wo-PIGEON, the ring-dove, which frequents the woods; a in the *United States*, the band-tailed pigeon, *Colva fasciata* (see PIGEON). WOOD'SARE, n. *-sär*, mat like saliva or froth found on herbs, being

a mere investment or covering for the larvæ of frog-hoppers; now popularly called cuckoo-spit. WOOD-SORREL, a common plant, having an acid taste; the *Oxalis acetosella*, ord. *Oxalidāceæ* (see OXALIDEÆ), which, it is claimed, is the true shamrock rather than trefoils. WOOD-SPIRIT, impure methyl alcohol; pyroxylic acid. WOOD'STONE, a common term for silicified wood. WOOD-TIN, a variety of tin ore—so called from its fibrous texture resembling that of wood—usually of a brown or yellowish-gray color. WOOD'WARD, in *OE.*, a forester; a warden of woods. WOOD'WORK, that part of a structure which is made of wood. WOODEN LEG, a stump or support made for a person as a substitute for a lost leg; an artificial leg made of wood. WOODEN SHOE, a shoe shaped out of wood; a sabot. WOODEN SPOON, a spoon made of wood; the name given to the last of the junior optimes in mathematical tripos at Cambridge University, England; at Yale University, the most popular student of the class. WOODEN-WARE, a general name for buckets, bowls, and other articles of domestic use made of wood. IN THE WOOD, applied to wine in casks.

WOOD, a. *wûd* [AS. *wód;* Goth. *vods,* mad, possessed: Ger. *wuth;* Dut. *woede,* madness]: in *OE.,* ravaging; furious. WOOD'LY, ad. *-lĭ.* WOOD'NESS, n. in *OE.* anger; rage; madness.

WOOD AND WOOD'Y FI'BRE: fibrous material which constitutes the principal portion of the substance of trees. Flowering plants agree with the higher cryptogams (ferns, club-mosses, horsetails) in the possession of 'fibro-vascular bundles'—longitudinal strands of tougher consistence than the Cellular Tissue by which they are surrounded. These bundles always contain two important constituents, *wood* and *bast,* arranged either in a *collateral* or in a *concentric* manner: in the former case the wood and bast are placed side by side in the bundle, and in the latter the bast surrounds the wood. In flowering plants the former arrangement prevails; in vascular cryptogams the latter. In cryptogams and monocotyledons the bundle is incapable of growth after its first formation, all the embryonic tissue being used up at once; but in dicotyledonous plants the bundle exhibits continuous increase in thickness throughout the life of the plant, by virtue of the persistence in active growth of a layer of embryonic tissue, the Cambium, which remains in the middle of the fibro-vascular bundle, interposed between wood and bast, both of which thus increase in thickness. Since the bundle lies in the cellular matrix with its woody portion directed towards the centre and its bast toward the circumference, the interposed cambium deposits each new layer of wood *outside,* and each new layer of bast *inside* the former one, and the term *exogenous,* commonly applied to the growth of dicotyledonous stems, is thus seen to be applicable as re-

gards tle woody portion of their fibro-vascular bundles only.

The fbro-vascular bundles of monocotyledons lie scattered separately through a cellular matrix, the *ground-substance* of the stem, which thus rarely possesses any great coisistence, and has no separable bark. In dicotyledonous stems, on. the other hand, the bundles anastomose at 'requent intervals in their course along the stem; and thischaracteristic distinction can be readily seen by examining the stems of any two types of these groups, say of alily or of a geranium, or more simply by inspection of heir leaves, in which a similar arrangement of bundles revails—that of the former exhibiting parallel, that of te latter reticulated venation. The cambium, too, tears reaily; thus dicotyledons have a separable bark.

In the dicotyledonous stem, that portion of the cellular grond-substance which remains at the centre within the bunces is termed *Pith;* that which lies wholly exterior to them under the epidermis is the cellular envelope; hile the narrow plates of cells lying between and sepating the anastomosing bundles, and thus connecting ie central pith with the circumferential cellular envelope are known as the medullary rays, or 'silver grain.'

In bo wood and bast, three main constituents are typically present—first, cells little modified from the ordinaryshape, and termed *parenchyma;* secondly, cells greatly longated and having their walls considerably thickene, these being termed *fibres* or *prosenchyma;* thirdly, essels or cell-fusions, formed by union of longitudinal ows of cells. Wood-vessels are known as dotted, spiral, nnular, etc., according to the mode in which their tckening is deposited. All the constituents of stems æ thus modifications of three main systems of tissue:

I. pidermis.
II. round-substance (pith, medullary rays, cellular envelope.)
III. ibro-vascular bundles—

Woo—	(Cambium, when present.)	Bast—
1. 'arenchyma.		1. Parenchyma.
2. rosenchyma.		2. Prosenchyma.
3. essels, dotted, spiral, annular, etc.		3. Vessels (sieve-tubes).

Numous anomalies occur in the structure of stems, perhapthe most remarkable being exhibited by the wood oonifers, which consists entirely of prosenchyma, the fibi bearing characteristic markings known as 'bordered js.'

To wdy fibre we are indebted for great part of our cordagand textile fabries, including the very finest of

them, as muslin and lace. Reduced to pulp, it is used for manufacture of paper.

A kind of fàctitious or artificial wood, called *Bois duré*, used for making ornamental articles, is formed of saw-dust, heated to a high temperature, and subjected to very great pressure. Its compactness and hardness exceed those of wood itself. Another kind is made by mixing blood with sawdust, and compressing. Some kinds of costly wood are imitated by mixing their sawdust with glue, and casting the mixture into the desired shape in molds. For various mechanical operations on wood, see WOODWORKING.

WOOD, ALEXANDER: Scottish physician: b. Cupar, Fife, 1817, Dec. 10; d. Edinburgh, 1884, Feb. 26. He was graduated from Edinburgh University with the degree of M.D. in 1839; and shortly afterward became one of the medical officers at the Royal College Dispensary in Edinburgh. He established a medical practice in that city, and was one of the most prominent members of the Royal College of Physicians and Surgeons there, being president of that organization in 1858-60, and representing it in the general medical college in 1858-74. His most important contribution to the practice of medicine was the introduction of the use of the hypodermic syringe for administering drugs; this he first brought into notice by the publication of a pamphlet in 1855, entitled *New Method of Treating Neuralgia by the Direct Application of Opiates to the Painful Point* He was also active in public life, and in the free-church movement, editing the *Free Church Educational Journal* for some time. In addition to the pamphlet mentioned he wrote *What is Mesmerism* (1851); *Smallpox in Scotland* (1860); *Preliminary Education* (1868).

WOOD, ALPHONSO: botanist: 1810, Sept. 17—1881, Jan. 4; b. Chesterfield, N. H. He graduated at Dartmouth Coll. 1834, studied divinity at Andover Theol. Sem. the next year, was a teacher at Kimball Union Acad., Meriden, N. H., 1836-49, practiced civil engineering 1849-51, was pres. of the Ohio Female Seminary 1851-57, and after filling for some time a chair in Terre Haute Female College, Ind., he was principal of Clinton Female Seminary, Brooklyn, N. Y., until 1865. He spent 1866 in travel, and settled, 1867, at West Fairs, N. Y. His publications included *Class-book of Botany* (1845); *New Class-book of Botany* (1861); *First Lessons in Botany* (1858); *Leaves and Flowers* (1863); *The American Botanist and Florist* (1870); *The Illustrated Plant Record and Guide to Analysis* (1876); and *Fourteen Weeks in Botany* (1879).

WOOD, ANTHONY: English antiquary: 1632, Dec. 17—1695, Nov. 28; b. Oxford. In 1647 he was entered at Merton College as a gentleman commoner, 1650 took his degree as bachelor, 1655 became M.A. Deriving from his

father an independence, he seems at first to have aimed at being a sort of jack-of-all-trades. Dugdale's *Antiquities of Warwickshire* influenced him to assiduous antiquarian study; and he pub. 1669 his *History and Antiquities of Oxford* (Latin trans. 1674). His *Athenæ Oxonienses* (1691) contained a full account of all the authors, bishops, etc., who had adorned that univ. 1500-1690. In this work he attacked the character of the great Lord Clarendon, for which he was prosecuted at the court of the univ., and expelled. His books and some MSS. he left to the university.

WOOD, De Volson: American engineer: b. Smyrna, N. Y., 1832, June 1; d. Hoboken, N. J., 1897, June 27. He was graduated from the Rensselaer Polytechnic Institute, Troy, N. Y., in 1857, was professor of civil engineering in the University of Michigan, 1857-72, professor of mathematics in the Stevens Institute of Technology at Hoboken, 1872-85, and from the last named date professor of engineering there. Among valuable inventions by him may be mentioned a steam pump, pneumatic rock drill, and an air compressor. He published: *Resistance of Materials* (1871); *Bridges and Roofs* (1873); *Co-ordinate Geometry* (1879); *Reaction Motors;* etc.

WOOD, Edward Stickney: American chemist: b. Cambridge, Mass., 1846, Apr. 28; d. 1905. He was graduated from Harvard in 1867 and obtained his medical degree in 1871. He was assistant professor of chemistry in the Medical School 1871-6, and full professor there from 1876. He published a translation of Neubauer and Vogel's *Analysis of Urine* (1879); and was an expert on all matters relating to poisons. From 1873 he was chemist of the Massachusetts General Hospital.

WOOD, Eleazer Derby: American soldier: b. New York, 1783; d. Fort Erie, Ont., 1814, Sep. 13. He was graduated from West Point in 1806 and in the second war with England conducted the defense of Fort Meigs in 1813, and was brevetted major for gallantry. He participated in the battle of Niagara or Lundy's Lane, 1814, July 26, and was brevetted lieutenant-colonel for services on this occasion. In the sortie of Sep. 13 he fell at the head of his command. A monument to his memory was erected at West Point.

WOOD, Ellen (Price); known as Mrs. Henry Wood: English novelist: 1814, Jan. 17—1887, Feb. 10; daughter of a glove-manufacturer in Worcester, England. She was married at an early age to the head of a shipping and banking firm established in France; and was a contributor for many years to several magazines. She made her first great success with *East Lynne* (1861), which not only attained universal popularity, but was praised by the London *Times* and leading critics as of high rank among the novels of the century. There rapidly followed

from her pen *The Channings,* and *Mrs. Halliburton's Troubles* (1862); *Verner's Pride,* and *The Shadow of Ashlydyat* (1863)—the second of these her best work; *Lord Oakburn's Daughters, Oswald Cray,* and *Trevlyn Hold* (1864)—all the six of the same high quality as *East Lynne.* From *Mildred Arkell* (1865), through the 20 years, from 1867, that her stories were the mainstay of the *Argosy* magazine, her popularity continued, with less to satisfy exacting criticism, owing to the haste, repetition, and commonplace sentiment and material which found place in her work.

WOOD, Sir Evelyn: English general: b. Cressing, Essex, 1838, Feb. 9. He was educated at Marlborough College and joined the navy in 1852. During the Crimean war he served in the Naval Brigade, and was severely wounded while carrying a scaling ladder to the redan. In 1855 he entered the army as cornet, in 1858 served in India as a brigade-major and gained the Victoria Cross for conspicuous valor, in 1860. In 1873 he served in the Ashantee war, and on his return from this campaign was called to the bar at the Middle Temple (1874). He served in the Zulu war of 1879 and was promoted to the rank of brigadier-general after his victory at Kambula. He was second in command of the British forces in the brief Transvaal war of 1881, and in 1882 went to Egypt as commander-in-chief or sirdar. In 1893 he became quartermaster-general to the forces, and held that position till his appointment in 1897 to the office of adjutant-general to the forces. He has published: *The Crimea in 1854* (1894); *Cavalry at Waterloo* (1896); *Cavalry Achievements.* Consult *Life* by Williams (1892).

WOOD, Fernando: politician: 1812, June 14—1881, Feb. 14; b. Philadelphia, Pa.; of Quaker descent. A resident of New York from 1820, and early engaged in business as a shipping merchant, he was from 1833 active with pen and voice in democratic politics and served as member of congress 1841, May 31—1843, Mar. 3. Defeated in 1850 in city election for mayor, he succeeded in 1854, and undertook reforms which secured him reelection in 1856. On the passage of a bill abolishing the municipal police, and creating the metropolitan, not under the mayor's control, he endeavored to resist the change, and at the next election was defeated. Again elected 1859, he advised, 1861, Jan., in sympathy with the secession of the southern states, that the city secede and become a sovereign free city. He obtained an election to congress, serving 1863, Dec. 7—1865, Mar. 3; and again, after a year in Europe, was in congress 1867, Mar. 4—1877, Mar. 3.

WOOD, George, ll.d.: lawyer: 1789, Jan. 17—1860, Mar. 17; b. Chesterfield, N. J. He graduated at Princeton 1808, studied law under Richard Stockton, and began practice in New Brunswick, where he attained the

highest rank in his profession for clearness of statement and power of reasoning. His arguments on cases of charitable bequests, in particular, accomplished much in clearing up the law and in shaping subsequent decisions. Removing to New York 1831, he was employed in many important litigations, and was in request in other states. At the same time he interested himself in the principles of our government and the elucidation of constitutional questions. It is related that an opposing lawyer in a case before the U. S. supreme court spoke of him to Daniel Webster as 'a sleepy-looking fellow named Wood.' 'If it is George Wood,' was the reply, 'I advise you to look out how you wake him up.'—He died in New York.

WOOD, GEORGE BACON, M.D.: medical professor and author: 1797, Mar. 13—1879, Mar. 30; b. Greenwich, Cumberland co., N. J. He was at school in New York, was graduated at the Univ. of Pa. 1815, in medicine 1818, and 1820 began to lecture on chemistry. He was prof. of chemistry in the Philadelphia Coll. of Pharmacy 1822-31, of materia medica 1831-35, of the same in the Univ. of Pennsylvania 1835-50, and had the univ. chair of the theory and practice of medicine 1850-60. He was physician in the Pa. Hospital 1835-59, was pres. for many years of the College of Physicians of Philadelphia, and became pres. of the Amer. Philos. Soc. 1859. In 1865 he endowed in the Univ. of Pennsylvania an auxiliary faculty of medicine, embracing chairs of zoology and comparative anatomy, of botany, of mineralogy and geology, of hygiene, and of medical jurisprudence and toxicology. He published *The Dispensary of the United States* (in conjunction with Franklin Bache, 1833); *A Treatise on the Practice of Medicine* (1847); *A Treatise on Therapeutics and Pharmacology* (1856); *Lectures and Addresses on Medical Subjects* (1859). He also prepared a *History of the Univ. of Pennsylvania* (1827); *Memoir of Samuel G. Morton* (1853); and *Memoirs of Franklin Bache* (1865).

WOOD, HENRY: American author: b. Barre, Vt., 1834, Jan. 16; d. 1909, Mar. 29. He was graduated from a commercial college in Boston in 1854 and has published: *Natural Law in the Business World* (1887); *Edward Burton*, a novel (1890); *God's Image in Man* (1892); *Ideal Suggestions* (1893); *The Political Economy of Humanism* (1901); *The Symphony of Life* (1901); etc.

WOOD, Mrs. HENRY. See WOOD, ELLEN PRICE.

WOOD, HORATIO CURTIS, M.D.: American physician: b. Philadelphia, Pa., 1841, Jan. 13. He was graduated in medicine from the University of Pennsylvania in 1862, and was professor of medical botany there 1866-76, and clerical professor of diseases of the nervous system since the last named date. In addition to many professional papers he is the author of *Thermic Fever*

(1872); *Physiological Therapeutics* (1874, 9th ed., 1894); *A Study of Fever* (1875); *Nervous Diseases and their Diagnosis* (1881); *Syphilis of the Nervous System* (1889).

WOOD, JAMES: soldier and gov. of Va.: 1750—1813, July 16; b. Olney, near Richmond; son of Col. James Wood, founder of Winchester, Va. He received a commission as capt. of state troops from Lord Dunmore 1774, and was elected to the house of burgesses from Frederick co. 1775. He went on a mission to the Indians of the west, to invite them to a treaty at Fort Pitt, 1775, July, and by great courage and judgment achieved success. The house of burgesses, in which he was serving, appointed him, 1776, Nov. 12, col. commanding the 8th Va. regiment of the line. He was in command at Charlottesville, Va., 1778, in charge of Burgoyne's captured army; was supt. of all the prisoners of war in Va. 1781; was commissioned brig.gen. 1781; was on the state council several years, and as senior member was lieut.gov.; was presidential elector 1789; and was elected gov. 1796, Dec. 1—1799, Dec. 1. He served as pres. of the Soc. of the Cincinnati 1802-13. He was vice-pres. 1797, and pres. 1801, of an abolition society.

WOOD, JAMES FREDERIC, D.D.: first Rom. Cath. archbishop of Philadelphia; 1813, Apr. 27—1883, June 20; b. Philadelphia; of English parentage. His childhood was spent partly with relatives in England, where he attended school. In 1828 he became bank-clerk in Cincinnati, and was cashier 1833-36; joined the Rom. Cath. Church; went to Rome to study for the priesthood in the College of the Propaganda, remaining 7 years; was ordained, and officiated as asst. rector of the Cincinnati cathedral until 1854, when he became pastor of St. Patrick's. He was made bishop of Gratianopolis 1857; transferred to Philadelphia as coadjutor of Bishop Neumann, whom he succeeded 1860. In 1869 he was a member of the Vatican Council. The great prosperity of his diocese under his administration led to its subdivision, and he was made archbishop 1875. He founded or promoted many institutions of learning and charity connected with his church, and his wise management brought the cathedral to completion in 1864. He died in Philadelphia.

WOOD, JAMES RUSHMORE, M.D.: surgeon: 1816, Sep. 14—1882, May 4; b. Mamaroneck, N. Y. He graduated at Castleton Med. Coll., Vt., 1834; was demonstrator of anatomy there; removed to New York; effected a reform of Bellevue Hospital, reducing the death-rate 600; began Saturday clinics; collected the best anatomical museum in this country, and gave it to the city 1856; founded the Wood anatomical prize, and, with others, the Bellevue Hospital Med. College, in which he was prof. of surgery and surgical pathology until his death. He achieved the reproduction of bones in the living body by separating

the periosteum from diseased bone, removing this; and he performed other novel and successful operations. He was surgeon also in other institutions, and pres. of the Pathological Soc. Besides his valuable surgical papers written for the medical journals, he published an essay on *Medical Education* (1848).

WOOD, JOHN: soldier and public official: 1798, Dec. 20—1880, June 4; b. Moravia, N. Y. When he became of age he emigrated to Ill., and built the first house on the site of Quincy 1822, of which city he was the most prominent citizen and a frequent official. He was a member of the state senate 1850-54; lieut.gov. 1856, and gov. 1859. At the opening of the civil war he was appointed quartermaster-gen. of the state; attended the peace conference at Washington 1861; was col. of an Ill. regt. 1864, and commanded a brigade at Memphis when Gen. Forrest captured that city the same year. Afterward, as quartermaster-gen. of his state, he was busy at home and in the southern field. In the early history of Ill. he was foremost in securing the state to freedom, against the efforts of pro-slavery men. He died in Quincy, where a monument to his memory was erected 1883.

WOOD, JOHN GEORGE: English author of books on natural history: 1827—1889, Mar. 4; b. London; son of a surgeon. He graduated B.A. at Oxford 1848; was two years connected with the anat. museum there; ordained in the Church of England 1852, and had charge of the boatmen's floating chapel; asst. chaplain of St. Bartholomew's Hospital 1856-62; and precentor of Canterbury Diocesan Choral Union 1868-76. He visited the United States and lectured 1882-3, and again 1884. His works on natural history are exceedingly numerous, and are of a popular character, instructive and entertaining, many of them illustrated by the best artists. They are mostly zoological, pertaining to England, and not a few of them for young readers. The first, *Natural History* (1852), had 450 illustrations by William Hervey. His other chief works were: *Illustrated Natural History* (3 vols. 1859-63), with 1,500 engravings; *Homes Without Hands* (1864); *Natural History of Man* (1868-70); and *Man and Beast, Here and Hereafter* (1874).

WOOD, LEONARD: soldier; b. in Winchester, N. H., 1860, Oct. 9. He was graduated at the Harvard Medical School 1884; appointed 1st lieutenant and assistant surgeon in the regular army 1886; served under Gen. Miles in the operations against the Apache Indians; and afterward was physician at the White House. At the outbreak of the war with Spain (1898) he became colonel of a volunteer regiment of cavalry known as the 'Rough Riders;' promoted brigadier-general U. S. V. July 8 following, for gallant service at the battles of Las Guasimas and San Juan Hill, and major-general U. S. V. Dec.

8 of the same year. On July 20, 1898, he was made military governor of the city of Santiago, and later of both city and province. On Dec. 5, 1899, he was appointed brigadier-general U. S. A., and Dec. 13 following succeeded Gen. Brooke as governor-general of Cuba; and in 1903 was promoted major-general U. S. A. He was governor of Moro province in the Philippine Islands 1903-6; commander of the Philippines Division 1906-8; and in the latter year returned to the United States to assume charge of the Department of the East.

WOOD, Thomas John: soldier: b. Munfordville, Ky., 1823, Sep. 25; d. 1906. He graduated at West Point 1845; served in the topographical corps and in the dragoons: participated in the principal battles of the Mexican war, and was promoted for gallantry at Buena Vista; was on the staff of Gen. Harney 1848-9; rose in the service to capt.; was on duty in Kansas during the troubles of 1856-58, and in Utah the following year. Promoted lieut.col. 1861, and made brig.gen. of vols., he had command of a division in the operations preceding and following the battle of Shiloh 1862, and was wounded at Stone River the last day of that year. The next year he was in the movements connected with the actions of Chickamauga and Mission Ridge, the relief of Knoxville, and the invasion of Georgia, and was in the battles of Franklin and Nashville, 1864, Nov. and Dec., commanding the 4th corps, though wounded severely at Lovejoy's Station in the preceding Sep. He was commissioned maj.gen. of vols. 1865, and commanded departments of the southwest. For distinguished service at Chickamauga he was brevetted brig.gen. in the regular army, and maj.gen. after the battle of Nashville. He retired from service 1871.

WOOD, Thomas Waterman: artist: b. Montpelier, Vt., 1823; d. 1903. He was pres. of the National Acad. of Design 1890-1900, succeeding Daniel Huntington, resigned. After studying with Chester Harding in Boston, and in Europe, he spent several years in Ky.; opened a studio in New York 1867, and was elected academician 1871, pres. of the Water-color Soc. 1878-87, vice-pres. of the National Acad. 1879-90. He was a member of the Etching Club, and of a similar Brit. soc. Besides portraits, water-colors, and etchings, he excelled in *genre* subjects, full of character and color.

WOOD, Walter Abbott: inventor: b. 1815, Oct. 23, in Mason, N. H.; d. 1892, Jan. 15; son of Aaron Wood, an early maker of the cast-iron plows invented by Jethro Wood. He worked until the age of 20 in his father's shops; settled at Hoosic Falls, N. Y., 1835. Later in business for himself, and making a study of farming machines, he took hold of Manny's reaper with his own improvements 1852, and, continuing to improve and invent, rapidly developed a very large business in reapers

and mowers. He took out about 30 patents, created the largest works of the kind in the world, obtained the highest recognition at Paris 1867, Vienna 1873, Philadelphia 1876, and Paris again 1878; and secured 80 to 90 per cent. of the foreign trade. It is computed that more than 600,000 machines in all were made by him. The concern was made a stock company 1866, with Wood as president. He was in congress as a republican 1879, March 18—1883, March 4.

WOOD, William: colonist: 1580-1639; b. in England. He came to New England 1629, returned to England 1633, came very soon again to New England and settled at Lynn for three years, was its representative in the Massachusetts general court 1636, and the next year settled in Sandwich. While in London he published *New England's Prospect, A True, Lively, and Experimental Description of that part of America commonly called New England* (1634). It was the earliest account of Massachusetts, and had a curious map of the country. It was republished 1764, and again 1865.

WOOD, William Maxwell, M.D.: surgeon: 1809, May 27—1880, March 1; b. Baltimore. He entered the navy as assistant surgeon 1829, became passed assistant 1835, was commissioned surgeon 1838, served on the coast of Florida in the Seminole war 1838-41, was made fleet-surgeon of the Pacific squadron 1843, obtained for Commodore Sloat the first news of the Mexican war, and thus led to the operations which resulted in the conquest of California. He served as fleet-surgeon of the East India squadron 1856-58, and of the n. Atlantic blockading squadron 1861-65; and was surgeon-general of the navy and chief of the bureau of medicine and surgery 1869, July 1—1871, May 27, when he reached the legal age of retirement.—He published *Wandering Sketches* (1849); *A Shoulder to the Wheel of Progress* (1849); *Hints to the People on the Profession of Medicine* (1852); and *Fankwei* (1859). He held a commission as medical director from 1871, March 3, and resided at Owing's Mills, Md.

WOOD-ALLEN, Mary: American physician: b. Delta, Ohio, 1841, Oct. 19; d. 1908, Jan. 21. She was graduated at the Ohio Wesleyan University in 1861, and at the Medical Department of the University of Michigan in 1875, and was married to C. B. Allen in 1863. She practised medicine for a time in Newark, N. J., and later removed to Ann Arbor, Mich. She published: *Man Wonderful in House Beautiful* (1883); *Teaching Truth* (1892); *Child Confidence Rewarded* (1893); *Marvels of Our Bodily Dwellings* (1896); *Almost a Man* (1896); *Almost a Woman* (1897); *Baby's Firsts* (1898); *What a Young Woman Ought to Know* (1898); *What a Young Girl Ought to Know* (1897); etc.

WOODBERRY, George Edward, litt.d., ll.d.: Ameri-

can critic and poet: b. Beverly, Mass., 1855, May 12. He was graduated from Harvard in 1877, became professor of English in the University of Nebraska, in 1878-9 was on the *Nation* staff, in 1879-80 was again at Nebraska, and subsequently, until 1891, was in active literary work, holding the literary editorship of the Boston *Post,* and contributing much to the *Atlantic.* From 1891 until his resignation in 1904 he was successively professor of literature and of comparative literature (from 1899) in Columbia University. He became known as an authoritative critic, and a poet of much distinction, and must be ranked among the most scholarly and important of the more recent American littérateurs. The titles of his works include: *A History of Wood-Engraving* (1893); a very valuable *Life of Poe* (1885); *American Men of Letters; The North Shore Watch, and Other Poems* (1890); *Studies in Letters and Life* (1890); *Makers of Literature* (1900); *Nathaniel Hawthorne* (1902); *American Men of Letters; Collected Poems* (1903); *America in Literature* (1903); *Algernon Charles Swinburne* (1905): *Ralph Waldo Emerson* (1907); *The Appreciation of Literature* (1907); *Great Writers* (1907); etc. He also edited the poetical works of Shelley (1892); Poe's works (1894; with Stedman); Lamb's *Essays of Elia* (1892); and Aubrey de Vere's *Select Poems* (1894). He is also editor of the *Journal of Comparative Philology.*

WOODBRIDGE, N. J.: township, Middlesex co.; on Staten Island Sound, and on the Central of New Jersey and the Pennsylvania railroads; about 25 m. s.w. of New York. It has regular steamer connection with New York. It has valuable deposits of fire-clay, and the chief industrial establishments are brick, tile, and drain pipe works. The township contains several villages. It has a high school, established in 1876, public and parish graded schools, and a public library. Pop. (1910) 8,948.

WOODBRIDGE, *wûd'brĭj,* JOHN: New England colonist and Congregational minister: 1614-1691, July 1; b. Stanton, Wiltshire, England. He was at Oxford University until the requirement for ecclesiastical conformity caused his withdrawal to private study; he came to New England 1634, and settled at Newbury, Mass.; was town-clerk 1634-38; married a daughter of Governor Thomas Dudley 1639; taught in Boston 1643; was one of the original purchasers of the land of Andover, Mass.; and became the first minister of the church there, ordained 1645, Oct. 24. He went back to England 1647; was chaplain with the commission which made a treaty with the king at the Isle of Wight; was minister at Andover, Hants, England, and in Wiltshire until ejected after the Restoration and on being driven from a school which he had started at Newbury, Eng., he returned to Massachusetts, and became assistant to his uncle, the Rev.

Thomas Parker, at Newbury, Mass., until 1670. The American Woodbridges are his descendants.

WOOD'BRIDGE, WILLIAM: lawyer and United States senator: 1780, Aug. 20—1861, Oct. 20; b. Norwich, Conn.; fifth in descent from the colonist John Woodbridge (q.v.). He removed with his father, Dudley (1747-1823), to Marietta, O.; was sent to school in Connecticut, and studied law at Litchfield; was admitted to the bar of Ohio 1806, and elected to the assembly 1807, and was in the state senate 1808-14. President Madison made him secretary of the territory of Michigan 1814, and he removed to Detroit, and later became the first delegate to congress from Michigan 1819-20. He was judge of the superior court of Michigan 1828-32, was in the constitutional convention 1835, member of the state senate 1837, governor of Michigan 1840-1, and member of the United States senate 1841, May 31—1847, March 3. He acted for a long time as legal adviser of John Jacob Astor, and was counsel in many important Canadian cases against the Hudson Bay Company.

WOODBURN, JAMES ALBERT, PH.D.: American educator and historian: b. Bloomington, Ind., 1856, Nov. 30. He was graduated at the Indiana State University in 1876; taught in the preparatory department of that university from 1878 to 1886; from 1889 to 1890 was fellow in history at Johns Hopkins University; and since 1890 has been professor of American history in the University of Indiana. He has written *Higher Education in Indiana* (1890); *Causes of the American Revolution* in *Johns Hopkins University Studies* (1891); *The Historical Significance of the Missouri Compromise* in *Reports of the American Historical Association* (1893); *The American Republic and Its Government* (1903); *Political Parties and Party Problems in the United States* (1903). He has also edited (with Prof. C. W. Hodgin) *Select Orations of Burke and Webster* (1892); Lecky's *American Revolution* (from Lecky's *England in the Eighteenth Century*), with bibliography and notes; etc.

WOODBURY, *wûd'bėr-ĭ:* city, capital of Gloucester co., N. J.; at the head of navigation on Woodbury creek, and on the Delaware River and the West Jersey railroads; 8 m. s. of Philadelphia. It contains a court-house, city hall, jail, numerous churches, public schools, academy, public library, opera-house, and weekly newspapers; manufactures glass, lumber, flour and patent medicines; is a shipping-point for large quantities of berries, fruit, and vegetables; and is a popular place of residence for many people doing business in Philadelphia. Pop. (1900) 4,087; (1910) 4,642.

WOODBURY, *wûd'bėr-ĭ,* DANIEL PHINEAS: soldier: 1812, Dec. 16—1864, Aug. 15; b. New London, N. H. He graduated at the United States Military Academy 1836,

was promoted 2d lieutenant in the artillery, then transferred to the engineers, and became 1st lieutenant 1838, July. After service to 1840 in constructing the Cumberland road in Ohio, he was on duty to 1847 in repair of works on the Atlantic coast, and as assistant in Washington. He had charge of construction at Fort Kearny and Fort Laramie till 1850, and on the North Carolina coast to 1856. He became captain of engineers 1853, major 1861, August 6, lieutenant-colonel September, brigadier-general of volunteers 1862, March 19. He assisted in constructing the defenses of Washington; rendered most valuable service in making roads, causeways, and bridges at Yorktown and in the advance on Richmond, and again at Fredericksburg in laying down pontoons, and in their prompt removal, under fire. He was in command at Key West from 1863, March, and died there of yellow fever.

WOOD'BURY, Isaac Baker: musical editor: 1819-1858, Oct. 26; b. Beverly, Mass. After a year's study of music in Europe, on his return to this country he taught music in the schools of Boston, until his removal to New York 1845, where he edited the *Musical Review,* and the *Musical Pioneer.* Among the compilations of church-music books and glee-books which he made were the *Anthem Dulcimer* (1850); *Liber Musicus* (1851); *Million's Glee-book* (1853); *Cultivation of the Voice without a Master; Self-Instructor in Musical Composition and Thorough Bass; Singing-School and Music-Teacher's Companion,* and *Melodeon and Seraphine Instruction Book.*

WOOD'BURY, Levi: statesman and jurist: 1789, Dec. 22—1851, Sept. 4; b. Francestown, N. H.; descendant of John Woodbury, colonist at Cape Ann 1624, and Salem (Naumkeag) 1626. He graduated at Dartmouth College 1809, studied law at Litchfield, Conn., and was admitted to the bar 1812; became clerk of the state senate 1816; was appointed judge of the state supreme court 1817, and removed to Portsmouth; became governor of New Hampshire 1823-4; was speaker of the state lower house 1825; was United States senator 1825, Dec. 5—1831, March 3; then secretary of the navy until 1834, secretary of the treasury until 1841, and again United States senator 1841, March 4—1845, Nov. 25. He was a democrat in politics, and voted, 1844, for the annexation of Texas. Declining the mission to England 1845, he was appointed to succeed Judge Story as justice of the United States supreme court, and held the office from 1846, Jan. 3, to his death. Three volumes of *Writings, Political, Judicial, and Literary,* from his pen, were published 1852, after his death. It was under him that the independent United States treasury system was first established.

WOOD'BURY PROCESS. See Positive Printing.

WOOD-CARVING.

WOOD'-CARVING: probably the oldest branch of art. Apparently the first weapon was a club, and the first attempt at decoration was some scratching or carving on it. Among the Egyptians, Greeks, and Romans wood-carving was much practiced.

A very remarkable relic is a life-size portrait-statue in the Boulak museum, and supposed to date B.C. 4000; it is carved from a single block of sycamore, and, unlike much later Egyptian work, is so natural and realistic that it may well be compared with the most modern sculptures. Of nearly the same date, and in the same collection, are panels from the inner walls of a tomb, with figures in relief full of spirit and delicacy of execution. Other examples are the coarser work on mummy-cases, also articles of furniture or implements that exhibit more care and skill, especially in representing plants. The climate of Egypt has tended to preserve these remains of ancient art in wood, usually very perishable. The earliest Grecian carving in wood seems to have been rude images of the gods. The Palladium, a figure of Pallas, guarded by the vestals in Rome, was of wood, and fabled to have been rescued by Æneas from the burning of Troy. Other statues are described by Greek and Roman historians; also highly ornate coffers. A cedar box with carved dogs was found by Dr. Schliemann at Mycenæ. The colossal statue of Athene by Phidias is well known to have been mostly of wood. —Of Roman remains in this art, only later examples are of interest, e.g., the door-panels of the church S. Sabina in Rome, dating in the 5th c., each with a scene from the Old or the New Test. Beautiful examples of intricate relief-carving from old wooden churches in Denmark and Norway have been saved from the buildings, now mostly destroyed; they date from the 9th to the 13th c. No better work of the kind was ever done.

In England every church had its reredos, retable, and other interior church fixtures, usually of carved wood; but these, because including images, were destroyed at the Reformation. Other old English work is represented in the effigies on tombs, e.g., the 12th-c. figure of Robert of Normandy in Gloucester Cathedral, and the admirable one of a knight, George de Cantelupe, in the Abergavenny church, which has also the relic of a colossal statue of Jesse, once serving as root for a gigantic carved tree forming a screen behind the altar. Church stalls, screens, and roofs of great beauty were produced in England from the 15th to the early 16th c. The beauty of the wood itself, however, was not appreciated, being overlaid with elaborate gilding and painting, which, in the surviving examples, has been scraped off by modern taste. For illustrations of some of the finest remains, see *Bury's Eccles. Wood-work* (1847), and Brandon's *Open Timber Roofs* (1856); and, for less meritorious examples, Small's *Scottish Wood-work of the 16th and 17th c.* (1878), and Sanders's similar work (1883). Near the end of the 17th c., realistic imitation with poor decorative effect came into vogue, as seen, e.g., in Trinity College, both of Oxford and Cambridge, and at Chats

worth.—In the middle ages, great Italian sculptors often carved crucifixes and statues of saints, a fine illustration of which is Nino Pisano's *Angel of the Annunciation*, now in the South Kensington Museum, London. Raphael made designs, of which his *Stanze*, in the Vatican, is an example; also the fine work in walnut at a church in Perugia. The same art flourished in Spain, France, and in Germany especially, where technical skill in the work has continued to the present time. The arabesques of the Mohammedan countries are famous; and the Hindu, Chinese, and Japanese work, of old and of the present, is wonderful.

The Centennial Exposition of 1876 gave an impulse to this art in the United States, already creating an interest by its practice in Cincinnati, where it was introduced by two Englishmen who had been employed on the houses of parliament. Benn Pitman did much to promote it, and it has for some years been a fashion among women of artistic inclination, as well as a frequent adjunct to educational institutions. The Cincinnati and other schools have searched successfully for models in our own flora and fauna. It should not be overlooked that a degree of native genius has often been applied to carving the figure-heads of ships, and even sometimes to the wooden images of tobacco-stores.—See Williams's *Hist. of the Art of Sculpture in Wood* (1835); Rogers's *Art of Wood-carving* (1867); Leland's *Minor Arts* (1880).

WOOD'-CHARCOAL: most important, though not the purest, kind of charcoal. Wood consists of carbon, hydrogen, and oxygen, the last two being in the proportion to form water. When heated in the open air, it burns completely away, except a small white ash; but if the supply of air be limited, only the more volatile matters burn away, and most of the carbon remains. This is the principle of the process of charcoal-burning in countries where wood is abundant. A number of billets of wood are built up vertically in two or three rows into a large conical heap, which is covered over with turf or moistened charcoal-ash, holes being left at the bottom for the air to enter. A hollow space also is left in the middle of the heap, to serve as a flue for the gaseous matters which are evolved. The heap is set on fire by throwing burning pieces of wood into the central opening, near the top of which, however, a kind of grate, made of billets of wood, is placed to prevent the burning fuel from falling at once to the bottom. The combustion then proceeds gradually from the top to the bottom, and from the centre to the outside of the heap; and as the central portions burn away, fresh wood is continually thrown in at the top, so as to keep the heap quite full. The appearance of the smoke shows how the combustion is proceeding: when it is going on properly, the smoke is thick and white; if it becomes thin, and especially if a blue flame appears, it is a sign that the wood is burning away too fast, and the combustion must then be checked, by partially stopping up the holes at the bottom, or by heaping fresh ashes on the top and sides, and pressing them down well, so as to diminish the draught. As

soon as the combustion is completed, the heap is entirely covered with turf or ashes, and left to cool for two or three days. It is then taken to pieces, and the portions still hot are cooled by throwing water or sand on them. 100 parts of wood yield on the average 61 to 65 parts by measure, or 24 parts by weight, of charcoal. (See Watts's *Dictionary of Chemistry*.) The charcoal thus prepared is the best suited for fuel. In England a large quantity of charcoal is obtained in the dry distillation of wood in cast-iron cylinders, for preparation of crude acetic acid: the charcoal thus prepared is preferable for making gunpowder, but inferior for other purposes. A peculiar kind of charcoal of reddish-brown color, hence termed *charbon roux*, is prepared in France, for manufacture of the gunpowder used in sporting, by subjecting wood in iron cylinders to the action of superheated steam under a pressure of two atmospheres: powder made with this charcoal absorbs moisture more rapidly than ordinary gunpowder.

The general properties of wood-charcoal are, that it is black and brittle, and retains the form of the wood from which it was derived; it is insoluble in water, infusible and non-volatile in the most intense heat; has power of condensing gases (see GASES); and, from its power of destroying bad odors, it has been regarded as possessing considerable antiseptic properties. It is frequently stated that charcoal is a poor conductor of heat, but a good conductor of electricity: these properties depend on the nature of the charcoal, the lighter wood, such as willow, yielding a porous charcoal, with little power of conducting heat or electricity; while boxwood yields a very compact charcoal, which is a good conductor of heat and electricity. Charcoal never consists entirely of pure carbon, the degree of purity varying directly with the temperature: thus, charcoal charred at 480° contains 65 per cent. of carbon, while that charred at 750° contains 80, and that charred at 2730° contains 96; but the loss of charcoal occasioned by these high temperatures is very great, the three percentages of charcoal corresponding to these temperatures being 50, 20, and 15.

The uses of wood-charcoal are numerous and extensive. It is very largely used as a fuel, taking in many countries the place of coal. From its being proof against all ordinary chemical agencies, a superficial charring is frequently resorted to for protecting wood from decay, as in the case of piles driven into mud or into the beds of rivers to serve as foundations. For the same purpose, it is a common practice to char the interior of tubs and casks destined to hold liquids. In a finely divided state it is commonly regarded as an antiseptic; and there is no doubt that the offensive effluvia from animal matter in an advanced stage of putrefaction disappear when the putrefying substance is covered with a layer of charcoal; but in reality the decay goes on, without emission of any odor, till at length the whole of the carbon is dissipated as carbonic acid gas, and the hydrogen as water, while the nitrogen remains as nitric acid. It has been shown that

the action consists in a rapid process of oxidation, dependent on the power which finely divided charcoal possesses of condensing oxygen. In a finely divided state, charcoal not only condenses gases to a marvellous extent, but has the power of absorbing coloring matters, bitter principles, etc.; hence it is of extensive use in the laboratory. From the rapidity of its absorbing action, Stenhouse has proposed to use a respirator filled with charcoal to protect the mouth and nostrils in an infected atmosphere; and the employment of trays of powdered wood-charcoal in dissecting-rooms, in the wards of hospitals, and in situations where putrescent animal matter is present, is found to exert a most beneficial influence in sweetening the atmosphere, by absorbing and decomposing the offensive gases. These properties render charcoal a valuable material in the construction of filters, not only for decolorizing, but likewise for purifying water for domestic use. It is employed successfully to prevent the escape of noxious vapors at the ventilating openings of sewers, as it allows free passage of air, but condenses the offensive effluvia in its pores, where they are destroyed by a process of oxidation. Besides its use in the manufacture of gunpowder, it has many applications in the arts. In medicine, it is at present used chiefly to destroy fetor; for which purpose it is applied in the form of powder or poultice to gangrenous sores, phagedenic ulcers, etc.; it is also largely employed in tooth-powders, as by its mechanical action it removes incrustations, while by its chemical action it destroys fetor of the breath. In indigestion accompanied by much flatulence, it may be given in doses of two or three teaspoonfuls suspended in water, or may be administered in the form of charcoal-biscuits. Very finely divided poplar charcoal is regarded as the best for medicinal uses.

WOODCHAT, *wûd'chăt* (*Lanius rutilus*): bird which, notwithstanding its name, is not a Chat, but a Shrike (q.v.). Its whole length is about 7½ in. The upper parts are mostly black, under parts white, with some white on head, wings, and tail; crown of the head and nape of the neck rich chestnut-red. The W. is abundant in s. Europe; and it is an African bird, being found from the Mediterranean to the Cape of Good Hope at all seasons of the year.

WOODCHUCK, *wûd'chŭk* (*Arctomys monax*): species of Marmot (q.v.), inhabiting N. America from Hudson's Bay to N. C., and w. to Neb. It is 15 to 18 in. long, grizzly gray, varying to blackish or chestnut color; the form thick, head broad and flat, with almost no apparent neck, legs short and thick, feet large, tail bushy. The hair is rather soft, the whiskers long and stout. This animal digs deep holes in fields, on the sides of hills, or under rocks in woods; its burrow often slants upward, so that water may not enter, and within are several compartments. It passes the winter in the burrow, in a lethargic state. It is easily tamed, and may be fed on bread, milk, and vegetables. It fights successfully with a dog of equal

size. The name of Ground-hog is sometimes popularly given to it. Its flesh is sometimes eaten, but is rank.—The Woodchuck feeds on various vegetables, but is destructive particularly to beans and red clover, though it tramples down much more of the latter than it uses for food. The use of traps or poisons, the burning of sulphur or explosion of cartridges in their burrows, are among the means for destruction of these pests.

WOODCOCK, *wûd'kŏk:* bird commonly regarded as of the same genus as the Snipe, but of more bulky form than the true snipe, and having shorter and stronger legs. The European Woodcock (*Scolopax rusticola*), well known as a game-bird in Great Britain, and highly esteemed as a delicacy for the table, is found also in all parts of Europe and n. Asia. It is one of the birds of Japan, and is sometimes found as a straggler in the e. United States. Its summer haunts are chiefly the pine-forests of n. Europe and Asia; but in summer it inhabits higher and dryer ground than in winter, when it is found chiefly in moist woods and swamps, seeking worms, snails, and slugs as food, boring with its long bill in the soft ground. The Woodcock feeds chiefly by night; and the quantity of food which it devours is very great. The Woodcock is about 13 inches in length; upper parts varied with ruddy, yellowish, and ash color, finely intermingled, and marked by large black spots; lower parts yellowish red, with brown zigzag lines; quills striped with red and black on the outer edge; tail feathers tipped with gray above and white below. The female is rather stouter and larger than the male. As woodcocks usually breed in very dry situations in the recesses of thick woods, the young ones would be left to starve but for the peculiar adaptation which enables the parent to transport them to moist feeding-grounds. It was long believed that the female Woodcock used only her feet for carrying her young from place to place; but Charles St. John, in *Natural History and Sport in Moray,* says that from close observation he found 'the old woodcock carries her young, even when larger than a snipe, not in her claws, which seem quite incapable of holding up any weight, but by clasping the little bird tightly between her thighs, and so holding it tight toward her own body.'—The American Woodcock, duck snipe, bog-sucker, big-headed snipe, mud snipe, etc., as this bird is variously named by gunners, is the *Philohela minor* of ornithologists. The body is full and robust; the wings short and rounded; the head and eyes very large, and the bill straight, tapering from the stout base, grooved for nearly the entire length and exceedingly sensitive at the end; there is practically no gape; the ear is situated beneath the eye; the legs are very short for a snipe, and the tibiæ are fully feathered. The woodcock is 10 or 12 in. long and weighs from 7 to 9 oz., the females being the larger. The colors are a soft harmonious blending of various

shades of brown and gray, with black mottling above, nearly uniform pale brown below. Except that it invades Ontario and other southern provinces of Canada the woodcock seldom ventures beyond the limits of the eastern half of the United States at any season. In winter it migrates to the South Atlantic and Gulf States, but most of them breed in the central and northern states.

WOOD DUCK, or SUMMER DUCK: the most beautiful of American ducks (*Aix sponsa*). The bill is very high at the base, shorter than the head; nail very large and much hooked; head crested; tail short, wedge-shaped. The head and crest are metallic green, glossed on the sides with purple; line through the eye; two bars on side of head meeting under the chin, and upper throat, white; lower neck and sides of tail purple, the former with triangular spots of white; lower parts white; sides yellowish banded with black and posteriorly with white; speculum bluish green, tipped with white; primaries silver white externally at tip; back uniform, with bronzed and green reflections; a white crescent in front of wings bordered with black; scapulæ and inner tertials velvet black with violet gloss. In the female the back is more purplish, the sides of head and neck ashy, about the bill white, and lower neck brownish; the eyes are red. It is 19 inches long, and 29 in alar extent. In most parts the plumage is iridescent with changing metallic reflections.

Formerly the wood duck, one of the most characteristic birds of our fauna, was abundant and widely distributed through the wooded and watered portions of the United States and southern Canada, but as a result of an unholy warfare it has become practically extinct over large areas. It is confined to fresh water, especially secluded ponds in woods. The flight is noiseless, very rapid, graceful, and as easy among the branches of trees as that of the wild pigeon. It breeds from April to June, according to latitude, the nest being made in the hollow of a tree, or in the deserted excavations of the woodpecker or squirrel, and usually in deep swamps, though often in the vicinity of houses, for they are not shy birds. The eggs are 6 to 15, 2 by 1½ inches, pale buff and greenish, smooth, and laid on dried plants and feathers. They are much attached to the breeding places. The young leap down, or are conveyed to the ground or water by their parents. The adults are excellent divers, and feed on acorns, nuts, grapes, berries, rice, insects, snails, tadpoles, and small fry. The chief enemies of the adults are minks, raccoons, and snakes, and many of the young are destroyed by snapping turtles, alligators, and predaceous fishes. It is easily domesticated and really breeds in captivity. The only other species of the genus is the famous mandarin duck of China.

WOOD-ENGRAVING.

WOOD'-ENGRAVING, or XYLOGRAPHY, *zī-lŏg'ra-fĭ*, art of engraving designs on wood. It differs from copper and steel plate engraving by having the parts intended to print on the paper in *relief*. While *plates* are printed from the engraved lines by a laborious and necessarily slow process (see ENGRAVING), wood-engravings, having the object to be represented on the surface, in the manner of a type, may be printed with the matter that it is intended to illustrate in the ordinary printing-machine—an important point in the illustration of books, on the grounds of cheapness and expedition. Another advantage of wood-engravings is, that they can be multiplied to any extent by means of the Stereotype (q.v.) and Electrotype (q.v.) processes.

Fig. 1.

The invention of W.-E., like that of gunpowder, has been claimed for the Chinese, whose books have certainly been printed from engraved wood-blocks for ages. It has indeed been asserted that the art of cutting figures in relief, and printing impressions of them on paper, was known and practiced by the Chinese as early as the reign of the renowned Emperor Wu-Wang (B.C. 1120). There is no doubt that wood-stamps were used by the ancient Egyptians and Romans for stamping bricks and other articles of clay; and that wood and metal stamps of monograms, etc., were used in various European countries, for attesting deeds and other documents, at a very early period, when the ability to write was an extraordinary accomplishment even for princes.

It is not, however, until the beginning of the 15th century that we find any evidence of the existence of wood-engraving, as we now understand it. It appears to have been used in Germany at that time for printing playing-cards and figures of saints. The earliest print of which any certain information can be obtained is in the collection of Earl Spencer. It was discovered in one of the most ancient convents of Germany—the Chartreuse of Buxheim, near Memmingen, in Bavaria—pasted within the cover of a Latin MS.; it represents St. Christopher carrying the infant Saviour across the sea, and is dated 1423. Fig. 1 is a reduced fac-simile of this curious

Fig. 2.

engraving. The inscription at the bottom has been thus translated: 'In whichever day thou seest the likeness of St. Christopher, in that same day thou wilt, at least, from death no evil blow incur.—1423.' Shortly afterward a series of books printed entirely from wood-engravings, called block-books, were issued. They consisted principally of religious subjects, with short descriptions engraved on the same block. The most important were the *Apocalypsis, seu Historia Sancti Johannis;* the *Historia Virginis ex Cantico Canticorum;* and the *Biblia Pauperum,* the last containing representations of some of the principal passages of the Old and New Testaments, with explanatory texts. The illustrations, of which Jackson, in his treatise on the *History and Practice of Wood-engraving,* gives an elaborate account and several specimens, seem to be drawn with contempt for perspective and proportion. Fig. 2 is a copy of a cut in the *Apocalypsis.* It represents St. John preaching to three men and a woman, with the inscription: '*Conversi ab idolis, per predicationem beati Johannis, Drusiana et ceteri.*'

By the preaching of St. John, Drusiana and others are withdrawn from their idols). Fig. 3, from the *Biblia Pauperum*, is curious as showing the general manner of representing the creation of Eve during the 15th c., the same subject frequently occurring previous to 1500. Both have the appearance of careful drawings 'spoiled in the engraving.' Previous to the invention of movable types whole books of text were engraved on wood, and the im

Fig. 3.

pressions had evidently been taken by *rubbing* on the back of the paper, instead of steady pressure, as in the printing-press, the ink used being some kind of distemper color.

The Psalter printed by Faust and Schöffer at Mentz 1457 (see GUTENBERG) is illustrated with initial letters engraved on wood, and printed in two colors, blue and red, which Jackson considers 'the most beautiful specimens of this kind of ornament which the united efforts of the wood-engraver and the pressman have produced. They have been imitated in modern times, but not excelled.' It is worthy of note that, though printed more than 400 years ago, the freshness and purity of the colors remain unimpaired.

As printing spread, the publication of illustrated books became general in Germany and Italy, and reached England 1476; in which year Caxton (q.v.) published the 2d ed. of the *Game and Playe of the Chesse*, with figures of the different pieces. They are very rude, compared with the earlier German works. Fig. 4 is a reduced copy of the *Knight*, interesting as one of the first wood-engravings executed in Great Britain: several works followed, all in

the same rude manner. The first attempt at something finer than simple lines appears in the frontispiece to the Latin edition of Breydenbach's *Travels*, printed at Mentz by Erhard Reuwich 1486. It is by an unknown artist, and is an elaborate and really very beautiful specimen of the art. It is also remarkable as being the first engraving introducing *cross-hatching* to represent dark shadows. The *Hypnerotomachia Poliphili*, printed at Venice by Aldus 1499, is worthy of mention for the extreme beauty of the designs, ascribed by some authorities to Raphael, by others to Mantegna. About the beginning of the 16th c., a complete revolution in the art of W.-E. was accomplished by

Fig. 4.

the genius of Albert Dürer. His productions exhibit not only correct drawing, but a knowledge of composition and light and shade, and attention to the rules of perspective, which, with the judicious introduction of subordinate objects, elevated them to the rank of finished pictures. Dürer, however, in common with most of the German artists of his day, gave little attention to propriety of costume in his religious subjects; one of his drawings in the *History of the Virgin* (1511), for instance, representing the birth of the Virgin, shows the interior of a German burgomaster's house of his own day, with a number of gossips drinking from flagons and otherwise enjoying themselves. There has been considerable discussion as to the probability of Dürer having also *engraved* his drawings. Most of the best authorities on the subject, including Bartsch, Jackson, and Firmin Didot, agree in the negative. Jackson, who speaks with the experience of a practical engraver, says: 'In most of the wood-cuts supposed to have been engraved by Albert Dürer, we find cross-hatching freely introduced: the readiest mode of producing effect to an artist drawing on wood with a pen or a black-lead pencil, but which, to the wood-engraver, is attended with considerable labor. Had Albert Dürer engraved his own

designs, I am inclined to think that he would have endeavored to attain his object by means which were easier of execution.' See DÜRER, for an account of some of his numerous works. The best of Dürer's contemporary artists on wood were the painters Hans Burgkmair (q.v.), Lucas Cranach (q.v.), and Hans Schäufflein. A series of works projected by Emperor Maximilian, including *The Adventures of Sir Theurdank*, *The Wise King*, *The Triumphs of Maximilian*, etc., were illustrated by these artists; but they are not equal to those of Dürer.

During the first half of the 16th c., the publication of books illustrated with wood-engravings increased. The superiority of talent, both in drawing and engraving, remained with the Germans. In France, though the figure-subjects were inferior to those of their German neighbors, their ornamental borders in prayer-books, etc., of which a great number were printed at this time, were extremely beautiful. In Italy and England the art was very far behind. The most remarkable work published at this time was the *Dance of Death* (q.v.), issued at Lyon 1538. The original ed. of this curious work contained 41 engravings, representing the struggle between Death, generally in the form of a skeleton, and different individuals, such as the Pope, the Emperor, a Judge, Monk, Doctor, Duchess, Old Man, etc. The drawings, characterized by great vigor and skill, are generally understood to have been executed by Hans Holbein (q.v.); but whether he also engraved them, as has been alleged, is more than doubtful. Toward the end of the 16th c., however, the art had made progress in Italy, where some of the best productions of Germany were equalled, if not excelled. In England it made little progress. John Daye published almost the only illustrated books of the time, notably Queen Elizabeth's Prayer-book, which contains a moderately well-executed portrait of that sovereign. There is no certain knowledge about any of the artists or engravers, although John Daye is supposed to have engraved some of his cuts himself. At this time also, the practice of printing wood engravings in colors from different blocks became somewhat common, though the attention of artists in that line was mostly confined to ornamental subjects. From the beginning of the 17th c. the decline of W.-E. may be dated; Germany, the cradle of the art, being the first to forsake it: the only works worthy of notice were a series of blocks on various subjects —designed by Rubens, and engraved by Christopher Jegher of Antwerp, one of the best wood-engravers of that period—some of which are of great beauty. From this time the art fell into neglect, not, apparently, for lack of engravers, since wood-cuts of a certain kind were always produced, but for lack of artists able or willing to make drawings worthy of preservation.

No noticeable change occurred until 1766, when John Michael Papillon, enthusiastic professor of the art in France, published an elaborate history of the subject in an unsuccessful attempt to restore it to its former importance. But it was not until the genius of Thomas Bewick (q.v.)

was brought to bear on it, that W.-E. received that impetus which has made it what it now is—one of the most important of the illustrative arts. Bewick's most eminent works are his histories of *British Quadrupeds* (1790) and *British Birds* (1804); all the quadrupeds, and almost all the birds, were drawn and engraved by himself. The birds especially are executed with a truthfulness and skill which have rarely if ever been equalled. These works are famous also for their collection of tail-pieces, which display immense humor and pathos. Fig. 5 is a reduced copy of one of them—a poor ewe, in the starvation of winter, picking at an old broom in front of a ruined cot. He en-

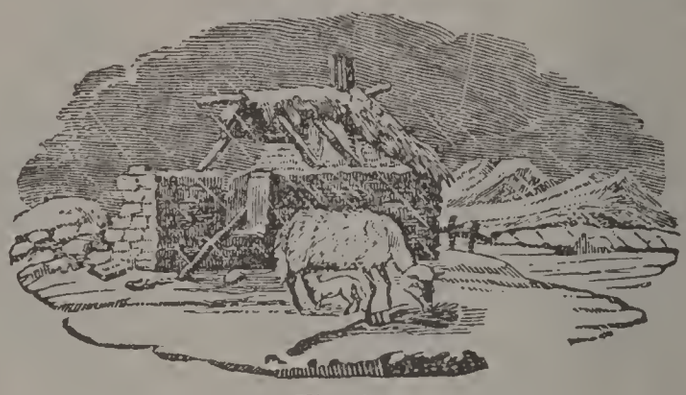


Fig. 5.

tirely abandoned the elaborate system of 'cross-hatching' which prevailed in the works of the older engravers, and produced his light and shade by the simplest possible means—a wonderful effect often resulting from a few lines.

Since Bewick's time, W.-E. has flourished without interruption. He left several pupils, the most successful of whom were Nesbet, Clennell, and William Harvey. Harvey, however, forsook the burin for the pencil; and his drawings illustrating Milton's *Paradise Lost*, Thomson's *Seasons*, etc., especially those engraved by John Thomson (perhaps the most skilful engraver that ever lived, and a pupil of Robert Branston, a self-taught engraver), still retain a first-class place as specimens of wood-engraving. The establishment of the *Illustrated London News* (1842) tended greatly to familiarize the public with the beauties of W.-E. In the pages of that periodical appeared the first drawings on wood of John Gilbert and Birket Foster. The spirited figure-subjects of the former, and the exquisite landscapes of the latter, have done much to raise the art to its present high place in England.

Of late years the art has made very great progress in France and Germany. The style of engraving, however, is so different from the English that a practiced eye can distinguish a French wood-cut at a single glance. The professors of the arts of drawing and engraving on wood in the present day are so numerous, and their works generally so well known, that it would be needless, even if space permitted, to attempt even to enumerate them.

In the United States, wood-engraving dates from near

the end of the 18th c., when Bewick's well-known English success led Alexander Anderson, engraver in New York, to try his hand on wood. He became an illustrator of publications, both home and foreign, and was employed by the Amer. Tract Soc. He had pupils in the art, such as Garret Lansing and others. But the quality of work was rude and in small demand; even in 1838 it is stated that there were not more than five engravers on wood in this country. The Amer. Tract Soc. did much to encourage more refined work, and the improvement has been very gradual, as shown by the comparatively coarse engraving in Harper's periodicals so late as the time of the civil war, or even later. Benson J. Lossing, taking up the art 1838, furnished many good examples of original engravings in his historical publications, to 1886. Harper's *Illustrated Bible* (1843) was a step in advance, due to the skill of Alexander Adams. Henry Marsh's remarkable work in illustrating Harris's *Insects Injurious to Vegetation* (1862) was one of the first examples of a departure from traditional style and of the susceptibilities of wood. From that time progress has been so rapid that American wood-engraving has become famous as superior to that of any other country. The most recent school among us numbers many engravers of so much note that their names are affixed to the articles in the table of contents of the *Century* and *Scribner's Magazine*, or on the title-pages of books. The effort to be original, however, as shown especially in the leading magazines, sometimes runs into libellous affectation (e.g., the frontispiece tornado or desperado portraits of distinguished authors in one of the magazines), or into a style analogous to the impressionist vagaries that are palmed off as paintings. Woodberry characterizes the recent 'fad' as showing 'a disregard of substance, shape, and material; a neglect of relief and perspective; a crowding the ground with meaningless lines, undirected, misdirected, or uselessly refined.' Others defend it as giving light, shade, body, without non-natural line-work.—Designs are now often photographed on the wood, instead of being drawn and tinted, and the peculiarities of manipulation may be due in large part to this method of preparation. Among the most noted and skilful of the present school are T. Cole, F. S. King, F. French, H. Wolf, H. W. Peckwell, G. Kruell, F. A. Wellington, F. A. Petit, A. Lindsay, W. M. Aikman, Closson, H. Baker, and others. Photo-engraving has already superseded much of the hand-work, and certainly has attained the seeming utmost of marvellous beauty in its best examples. See Linton and Woodberry's histories of wood-engraving, 1882 and 3, and articles on the subject in *Scribner's* and the *Century*.

Practice of Wood-engraving.—The wood used for engraving is boxwood, which has the closest grain of any wood, known. It is largely imported from Turkey for the purpose, as there it grows to a good size. It is cut *across* the grain in slices, which are dressed to the same height as type, for convenience in printing. Inferior kinds of wood, such as American rock-maple, pear-tree, plane-tree, etc., are used

for coarser purposes; and for very large and coarse subjects such as posting-bills, common pine is used, and cut on the *side* of the wood with chisels and gouges. When *blocks*—as the pieces of wood are termed—are required of a larger size than a few inches square, it is necessary to join two or more pieces together, as the amount of *sound* wood to be got out of even a large slice is extremely limited. There is, however, for all practical purposes, no limit to the joining process, as blocks have been printed consisting of 50 to 100 pieces. The wood having been made very smooth on the surface, and squared to the required size, is prepared for the artist by being covered with a preparation of white (commonly water-color Chinese white); this gives a very good surface for the pencil to work on. The subject is then drawn in the ordinary way, the tints being generally washed in with India-ink, and the details filled in with pencil. When the drawing is finished, it is given to the engraver, who, before beginning, carefully covers the block with paper, fastened round the edges with bees-wax; this is necessary, to avoid rubbing the drawing out in the process. As the engraving proceeds, he gradually tears the paper off.

The tools or gravers necessary in W.-E. are of three kinds—viz., gravers proper (fig. 6, *a*); tint-tools (fig. 6, *b*); and scoopers, or cutting-out tools for clearing out the larger pieces (fig. 6, *c*). They are arranged in different

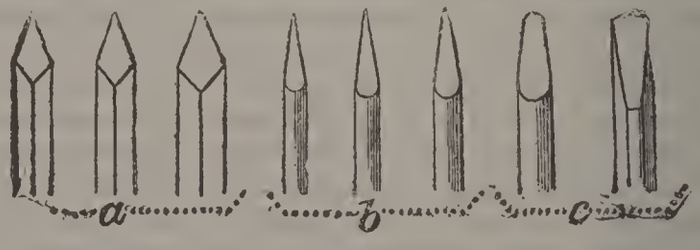


Fig. 6.

sizes, to suit the different portions of the work. Fig. 7 represents the method of using the graver. Most engravers

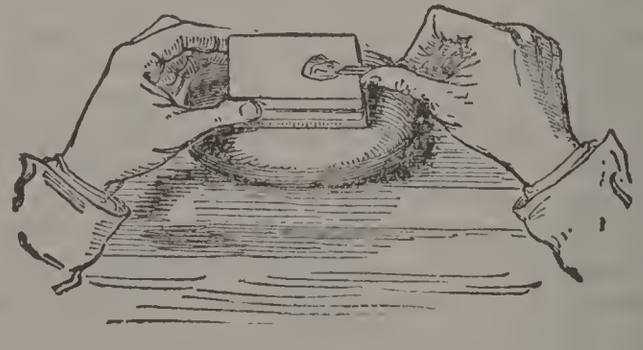


Fig. 7.

use a glass of slight magnifying power, more for relieving the eyes from the strain of fixing both eyes closely on a small object, than for magnifying the work. When gas or other artificial light is used, a glass globe filled with

water, slightly tinted with blue (to neutralize the reddish glare of the light), is placed between the flame and the work: this serves the double purpose of concentrating the light on the block and keeping it out of the eyes. When the drawing is in outline, or mostly so, the engraving is very simple: the process consists of engraving a line along each side of the pencil lines, which are, of course, to be left in relief, and afterward cutting out the pieces between. It will thus be understood that every part of a wood-cut which prints on the paper is the surface of the wood left untouched, and that every white part is cut or hollowed out. Fig. 8 represents a little subject *outlined;* fig. 9 is the same subject *finished.* When it is complicated with much shading, trees, etc., it becomes much more difficult, and brings into play the artistic talents of the engraver to preserve the proper shades, or *color* as it is technically termed, and texture of the different objects. Some engravers of the present day are celebrated for their power of producing beautiful pictures altogether by 'graver-work' from drawings made entirely with the brush. Skies and flat tints are engraved with tint-tools, which, from

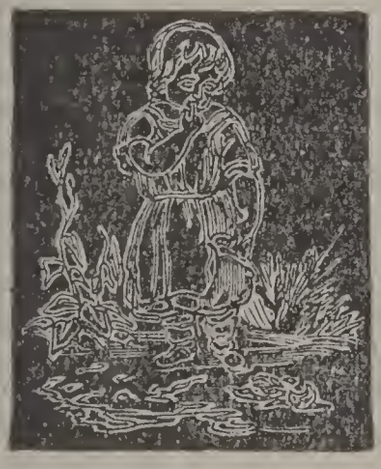


Fig. 8.

Fig. 9.

their shape, are best adapted for cutting straight lines; and by judicious use of the different sizes, the lines are left wider or closer, thicker or thinner, as the tint is wanted darker or lighter. As already mentioned, the tools are arranged in sizes—i.e., those for light tints are broader at the points than those for dark tints, so as to cut out more white. Trees, foregrounds etc., are cut with *gravers*, which, as they are like a lozenge in shape, give more scope for freedom of handling.

When the drawing is all engraved, a proof is taken by inking the surface gently with printing-ink on a dabber (a ball of cotton covered with silk), and, a piece of *India-paper* being laid on it, by rubbing the paper with an instrument called a *burnisher*, until it is all printed. The engraver then sees what touching up is required before it is finished and ready for the printer.

When large blocks are to be engraved, the pieces of

wood are joined with screw-bolts, and the drawing prepared in the usual manner; after which the pieces can be taken apart for convenience in engraving, also for more rapid finishing by having an engraver working at each piece: a point of importance in many cases—e.g., in the large engravings in the illustrated newspapers.

As wood-engraving, however, is a slow process, many attempts have been made to introduce a substitute for it. The point aimed at is to produce by some process of etching (see ENGRAVING), or otherwise, an engraving in relief directly from the drawing of the artist, without intervention of the engraver at all. Many processes have been invented for this purpose, being various modifications of Zincography, Graphotype, and Lithography. The most successful plan is based on the method devised in France about 1860 by Gillot, and introduced into England by Leitch (hence often called *Leitch's Process*). A *Gelatine Process* is now largely used in the United States. A photograph from an engraving or a drawing in lines is placed above a plate of gelatine, chemically sensitized. The parts of the gelatine exposed to the light become quite hard, and the rest is brushed away with warm water. From the plate an electrotype may be taken directly. Compare PHOTOGRAPHIC ENGRAVING; PHOTOGRAPHY.

See Hamerton's *Graphic Arts* (1882); Woodberry's *History of Wood-engraving* (1883); Marx's *Wood-engraving* (1881); Linton's *Wood-engraving in America* (1882); Jackson and Chatto's *History and Practice of Wood-engraving* (new ed. 1861); Papillon's *Traitê de la Gravure en Bois* (1766); Bartsch's *Peintre-graveur;* Ottley's *Inquiry into the History of Engraving on Copper and Wood:* Firmin Didot, *Essai sur l' Historie de la Gravure sur Bois* (1863).

WOOD'EN-WALL: the side of a ship; hence, a ship itself. The expression Wooden-walls, as referring to the protection of a country by its navy, is by some writers traced to the utterance of the oracle at Delphi when Athens was in imminent danger from the Persians, B.C. 483, during the invasion of Xerxes. The oracle, intimating disaster for the city, added that a wooden wall should still shelter her citizens. This was interpreted as referring to ships; a great naval force was prepared; and the result was the victory of Salamis.

WOODFORD, *wûd'ford*, JAMES RUSSELL, D.D.: Anglican prelate: 1820, Apr. 30—1885, Oct. 16; b. Henley-on-Thames. He graduated at Cambridge 1842, with high honors in mathematics and classics; was ordained 1843; and ministered at Easton 1847-55, Kempsford 1855-68, and Leeds. He was examining chaplain of Bishop Wilberforce, from whom he received the honorary canonry of Christ Church, Oxford. He was select preacher at Cambridge repeatedly. In 1873 he was consecrated bishop

of Ely. Besides several vols. of sermons and charges, he published *Leetures on the Creed,* and on *The Church, Past and Present.* After his death were issued *The Great Commission,* 12 addresses (1886), and two vols. of sermons (1887).

WOOD'FORD, STEWART LYNDON, LL.D.: lawyer: b. New York, 1835, Sept. 3. He entered Yale, but graduated at Columbia 1854, and studied law, which he practiced in New York. He was United States assistant attorney for the s. district of New York 1861-2. He was in the army 1862-65, serving as chief of staff to Gen. Gillmore, and subsequently commandant of Charleston and Savannah, with brevet rank of brigadier-general. After the war he entered public life as a republican; was lieutenant-governor of New York 1868-70; candidate for governor 1870; member of congress 1872; and United States district attorney for s. New York 1877-83. In 1897 he was appointed minister to Spain, which post he held till the beginning of the war with Spain, when the office became vacant.

WOOD'FORD, WILLIAM: soldier in the revolution: 1735-1780, Nov. 13; b. Carolina co., Va. He bore an honorable part in the French and Indian wars; and at the beginning of the revolution, 1775, was appointed colonel of the 2d Virginia regiment. At Hampton Roads he saved the town of Hampton, repulsing Lord Dunmore, five of whose vessels were sunken; and was in command at Great Bridge, on Elizabeth river, defeating the British without loss of a man, while 55 of the enemy were killed. Summoning the militia of Norfolk and Princess Anne counties, he took possession of Norfolk. In 1777, Feb., he was commissioned brigadier-general; commanded the 1st Virginia brigade; fought and was wounded at the battle of Brandywine; and was prominent in the battles of Germantown and Monmouth. Sent to the relief of Charleston, S. C., he marched his force thither, 500 m., at the rate of 18 m. per day; was taken prisoner 1780, May 12, the month after his arrival, and sent to New York, where he died. A county in Kentucky and another in Illinois were named in his honor.

WOODHOUSE, *wûd-hows,* ROBERT: English mathematician: 1773, Apr. 28—1827, Dec. 23; b. Norwich, England; cousin of Amelia, authoress, and wife of the painter Opie. Woodhouse graduated at Cambridge 1795, with high honors; was fellow 1798; professor of mathematics 1820; professor of astronomy and experimental philosophy 1822; and first director of the observatory 1824. His works are said to have revolutionized mathematics. He published *Principles of Analytical Calculation* (1803); *Plane and Spherical Trigonometry* (1809); *Isoperimetrical Problems and the Calculation of Variations* (1810); and *Elementary Treatise on Plane Astron-*

omy (1812), republished as *Treatise on Astronomy*, 2 vols. (1818-23). He died in London.

WOODHULL, *wûd'hŭl*, JOHN, D.D.: Presbyterian divine: 1744, Jan. 26—1824, Nov. 22; b. Miller's Place, Long Island, and of a family distinguished in colonial and revolutionary history. He graduated at Princeton, 1766; was pastor of Leacock Presb. Church, Lancaster co., Penn., 1770—79; and in 1777 mustered all the men of his parish to reinforce the patriot army at Valley Forge, himself acting as their chaplain. Called to Freehold, N. J., 1779, he advised Gen. Washington to retaliate for the murder by the British, without trial, of Capt. Joshua Huddy, at whose funeral Dr. Woodhull had preached to a great concourse. In 1785 he was on the committee that devised the present organization of the Presbyterian body; and 1812 he assisted in founding Princeton Theological Seminary. He died in Freehold. Several of his published sermons are extant, including *The Establishment of the Federal Constitution* (1787); and *The Death of General Washington* (1799).

WOOD'HULL, MAXWELL: naval officer: 1813, Apr. 2—1863, Feb. 19; b. New York; only son of the founder of Williamsburgh, L. I., Richard Miller Woodhull. He entered the navy 1832, June 4, and after service in the Mediterranean, on the coast of Africa, at Brazil, and in the Gulf of Mexico, he engaged in the survey of New York harbor, made plans for removal of obstructions from Hell Gate, and executed surveys on the New England coast. In the civil war, with rank of commander 1861, July 1, he organized the supply service for the blockading fleet, commanded a division of the James river flotilla in the Peninsular campaign, was later attached to Admiral Wilkes's flying squadron in Florida waters, and after being ordered north was accidentally killed.

WOOD'HULL, NATHANIEL: revolutionary soldier: 1722, Dec. 30—1776, Dec. 10; b. St. George's Manor, Long Island, N. Y.; great-grandson of Richard Woodhull, colonist (1648). In the French war he was a major under Abercrombie, 1758, in the attack on Crown Point and Ticonderoga; later he served under Bradstreet against Fort Frontenac, and under Gen. Amherst 1760. He was a representative of Suffolk co., L. I., in the N. Y. colonial assembly 1769-75, and on the suspension of the colonial govt. 1775, May, and the rule of the provincial congress until 1777, Apr., he was pres. of this provincial body 1775 and 6. He had been a col. from 1760, and was made a brig.gen. 1775, Aug. On the landing of Brit. troops on Long Island, he commanded the local militia, and shortly after the battle of Long Island was surprised by Brit. light horse, and so severely wounded as to cause his death.

WOOD'LAND: city, county-seat of Yolo co., Cal.: on

the Southern Pacific railroad; about 85 m. n.e. of San Francisco, and 20 m. n. of Sacramento. It is in an agricultural region, in which wheat and grapes are among the chief products. Many sheep are raised in Yolo co. The chief industries are connected with raising and shipping grapes, manufacturing wine, and shipping wheat, fruit, barley, wool, and live stock. The educational institutions are Holy Rosary Academy (R. C.), Hesperian College (Disciples of Christ), opened in 1861, a high school established in 1895, graded elementary public and parish schools. The four banks have a combined capital of $1,468,700. Pop. (1900) 2,886.

WOOD-LARK: a European lark (*Lullula arborea*) closely allied to the sky-lark, but distinguished by its smaller size, shorter tail, a distinct light streak over the eyes and ears, and more distinct markings on the breast. It perches upon trees, and is found chiefly in fields near the borders of woods. Its flight is much less extensive and powerful than that of the sky-lark. The wood-lark often sings during the night, and on this account has been mistaken for the nightingale. 'Its song' is described as 'sweet and flute-like, more melancholy than that of the sky-lark, and is generally uttered from the top of some tree or else when the bird is on the wing. It rises to some height before commencing, then ascends, singing, higher and higher, throwing itself from side to side, hovers and floats in the air, and when the song is ended drops with closed wings to the ground again.' It bears confinement well, singing sweetly in the cage, and even breeding easily there or in an aviary: hence it is constantly caught and kept. The nest is generally built under bushes. The eggs are five in number, of a dusky color, spotted with deep-brown spots.

WOOD-LOUSE: one of the little isopod crustaceans of the family *Oniscidæ*, which abound underneath logs and in decaying stumps in the woods, and which, when touched, curl up for protection like armadillos. They are numerous and hardy, the sexes are distinct, and the young are hatched from the eggs in their full form, passing through no metamorphoses.

WOODMEN OF AMERICA, Fraternity of Modern: a fraternal and beneficial order founded in 1883. It had 12,099 local camps and 920,079 members in 1908. Since its organization it has disbursed over $64,561,733 in benefits.

WOODMEN OF THE WORLD: fraternal order founded 1890. In 1908 it had 3 sovereign and 8,567 subordinate camps, with 529,023 members. Since organization it has disbursed in benefits, $40,876,456.

WOOD-MOUSE: the red-backed mouse. In England the long-tailed field-mouse (*Mus. sylvaticus*) is so called.

WOOD NYMPH: a minor pagan divinity supposed to live in trees and woods. This is the common name, also,

of the beautiful lepidopterous insects comprising the genus *Eudryas.*

WOOD OIL: the name given in commerce to a resinous juice which exudes from various trees in eastern Asia. It has a fine aromatic color, and is used for a great variety of purposes; in medicine as a substitute for copaiba balsam; by sailors for paying the seams of a ship instead of tar; by painters as a varnish; also in the making of lithographic ink, etc. It is an excellent preservative of timber against the attacks of white-ants. It is strictly an oleo-resin, and is also known as gurjun balsam.

WOOD'PECKER: a bird of the genus *Picus,* family *Picidæ,* and order *Scansores;* so named from its habit of piercing the bark of trees in search of its food. The toes are in pairs, two before and two behind, with sharp strong claws; the bill is rather long, straight, and wedge-shaped, with hard tip, tip and sides compressed; tail is usually lengthened and rigid, though in some it is short and rounded; the vertebræ of the neck are greatly developed, and the last of the caudal vertebræ is very large, with a long ridge-like spinous process; the whole structure adapting these birds to run and climb with great facility on the stems and branches of trees, in which they aid themselves by the tail, like Creepers, and to seek their food, chiefly insects and their larvæ, by digging in the bark and wood of trees with their bill. In addition to the particulars already noticed, they have the tongue fitted to serve as an important instrument in obtaining their food; the branches of the hyoid bone being greatly elongated backward, and in front moving as in a sheath; a peculiar arrangement and development of muscles enabling them to extend the tongue far beyond the bill; its tip being horny, and furnished with barbed filaments, while its surface is covered with a glutinous saliva, secreted by two large glands. Their powers of flight are very moderate, and the keel of the breast-bone is small. The Barbets and Wrynecks are referred to the family *Picidæ.* Woodpeckers are diffused over almost all parts of the globe, but abound chiefly in warm countries. The species are very numerous. They are mostly solitary in their habits, and live in the depths of forests. They feed in part on fruits and seeds as well as on insects; but much of their time is spent in pursuit of these, and they may be heard at a considerable distance, tapping the wood of trees with their bill, to discover the place where an insect is lodged, and to reach it when discovered. The common notion that they are very injurious to trees is erroneous as they do more good by preventing the ravages of insects than harm by their pecking. They strike out chips of wood with their strong bill, and in this way enlarge holes in decayed parts of trees for a roosting-place or a nest, carrying away the chips to a distance, especially in the case of a nest, as

if for precaution that it may not be discovered. The nest consists of a mere hole in a tree, perhaps with a few chips in the bottom of it, but with no other lining. The plumage of woodpeckers is generally of strongly contrasted colors, black and white, or green and yellow, with red marks about the head. There are several well-marked groups of woodpeckers, differing in form, plumage, and habits, and of different geographic distribution.

The most common species in the central portions of the United States are the Red-headed Woodpecker, and the Golden-winged Woodpecker (otherwise called the Yellow-hammer, Flicker, and High-roller), which has a near relative in the Red-shafted Flicker of the west, e. to Kan. At certain seasons, the Hairy Woodpecker, lengthwise streaked, and the Downy Woodpecker, smaller and exactly similar (except the outer tail-feather, barred black and white), are common. The Yellow-bellied Woodpecker is said to be the only N. Amer. species that injures trees. The Red-bellied Woodpecker is most frequent s. and w. The Red-cockaded Woodpecker, a red line on each side of the head, is found in swamps in the s.e. states, n. to Pa. The Black-backed Woodpecker, the crown yellow in the male, and the similar *Picoides americanus*, the back with white, are far n. species, s. in winter to the n. states. The Ivory-billed Woodpecker, the crest scarlet in the male, black in the female, is southern. The great Logcock, length 1½ ft., front of the scarlet crest black in the female, is shy and rare, in dense forests.

Only four specimens are found in Britain, and one of them, the Great Black Woodpecker, rare, is about 16 in. long; black, with a red cap on the head. It is found in the pine-forests of many parts of Europe.—The Great Spotted Woodpecker (*P. major*), called also French Pie and Wood Pie, not uncommon in England, is found on the continent of Europe from Norway to the Mediterranean: it is about 9½ in. in length. The color is black, varied with white, under parts grayish white; back of the head in the male bright scarlet. The Lesser Spotted Woodpecker (*P. minor*), about 5¾ in., is widely distributed in Europe and n. Asia.—The most plentiful of all Brit. species of woodpecker, the Green Woodpecker, is common on the continent of Europe from Scandinavia to the furthest south. It is about 13 in. in length, and is mostly of dark-green color, tinged with yellow; crown and back of head, bright scarlet. Among its popular English names are *Woodspite, Yaffle, Whetile,* and *Woodwall.* The Green Woodpecker belongs to a group or section of woodpeckers entirely confined to the old continent, and more frequently seen seeking their food on the ground than are the more typical species.—The genus *Picumnus* is the type of a group of *Picidæ* called *Piculets*, very small birds, with bill hard at the tip, broad round-

ed wings, and short tail with broad rounded feathers, not used for support, departing from the typical characters of the family. They inhabit warm parts of S. America, India, and the Eastern Archipelago.

WOOD-PRESERVING: preventing the decay of wood from damp, atmospheric action, or the destructive operations of animals and parasitic plants. Several processes have been employed. The principle in all has been the same—the injection into the vessels of the wood of some mineral material, which, by combining with the albumen of the woody tissue, prevents its decomposition, or gives it a poisonous character. The chief of the methods in use are that called Kyanizing, creosoting, in which the preserving material is the so-called creosote, or crude carbolic acid of coal-tar, and the Boucherie process, used chiefly on the continent of Europe. In this last a solution of sulphate of copper is used. While the tree is still growing, the head of the tree is cut off, and the top of the bare stem is hollowed into the form of a bowl, which is then filled with the solution, which is afterward supplied as required. The liquid penetrates downward, killing the tree as it goes, but giving to the wood a remarkable durability, particularly for such purposes as railway sleepers, etc.

WOOD-PULP: There are three kinds used—ground wood, soda-process wood and sulphite-process wood; the latter two are not wood in either physical or chemical properties, but cellulose, similar to cotton fibre in appearance and nature. (See PAPER; PAPER INDUSTRY.) The name of wood-pulp is generally understood as designating mechanically ground pulp as distinguished from chemical pulp, or cellulose. In the manufacture of mechanical wood-pulp a block of wood is put against the surface of a rapidly revolving grindstone by hydraulic or other pressure, a stream of water pouring down upon the stone carrying away the disintegrated fibres into a stuff-chest, where they are mixed with a percentage of sulphite or other cellulose, and are then ready to go on the paper machine to be converted into paper. Spruce principally, but also poplar and other soft woods are used in the manufacture of this pulp. Experiment has demonstrated the possibility of using the Scrub Pine for pulp, but it has not been used commercially.

Ground wood was invented in Germany in 1847 by Keller and perfected and patented by Henry Voelter, who constructed a machine which is in general use today. Mr. Albrecht Pagenstecher, of New York, bought and controlled the Voelter patent and introduced this industry into the United States in 1867-68, importing two machines, which were set up in Curtisville, Mass. The introduction of this new process marked a new era in the manufacture of paper. It furnished a cheap and abundant raw material, simplified the former complicated methods of preparing stock for paper machines,

and improved the quality of the paper made, besides cheapening the cost of production. Without wood-pulp it would be impossible to supply the demand for paper at the present day.

Wood-pulp was first sold at 8 cents per pound, but finally dropped to less than 1 cent per pound, and brought the price of newspaper from 14 cents in 1868 down to less than 2 cents per pound, making the one-cent newspaper possible.

The introduction of ground wood-pulp printing paper in rolls completely revolutionized modern methods of journalism. The absorbent quality of this wood-pulp paper made the modern rapid printing press practicable, eliminating the allowance for drying, and limiting the printing speed only by the mechanical possibilities of the press, which were in no way dependent, as in the case of rag paper, upon the drying of each sheet. Such an improvement made immediate changes in the making and printing of newspaper, and as soon as the results of this new process became commercially practicable, the entire system of news gathering changed as well. It has since become possible for a paper, with the help of the modern type-setting machine, to get news into the streets within fifteen minutes after its receipt in the printing office.

The output of wood-pulp, which in 1868 was less than one ton per day from the only mill then in existence, increased to over 5,000 tons per day in 188 mills, requiring in its manufacture nearly 2,000,000 cords of wood annually, and the use of water-power amounting to about 400,000 horse-power.

WOOD-RAT: a large rat-like wild mouse of the genus *Neotoma,* of which two species dwell in the forests of the southern half of the United States. The body is 8 or 9 in. long, and the tail nearly as long. The form resembles that of the white-footed mouse (*Microtus*), the animal being more slender and squirrel-like than are the true or house rats, from which this may always be distinguished by his hairy tail, softer fur, and much larger ears. The best known species is the Alleghany wood-rat (*N. pennsylvanica*), which is lead-color above, sprinkled with black hairs, which lightens to yellowish on the flanks and becomes pure white on the abdomen and feet.

WOODROW, James, ph.d., ll.d.; American Presbyterian clergyman and college president: b. Carlisle, England, 1828, May 30; d. 1907, Jan. 17. He was graduated from Jefferson College, Canonsburg, Pa., in 1849, subsequently studied at the Lawrence Scientific School at Harvard, and at the University of Heidelberg. He was professor of natural science in Oglethorpe College, Ga., 1853-61, entered the Presbyterian ministry in 1860 and was Perkins professor in the Presbyterian Theolog-

ical Seminary, Columbia, S. C., 1861-84. From 1891 to 1897 he was president of South Carolina College.

WOODRUFF, *wûd'rŭf*, or WOOD'ROOF, *-rôf:* plant of the genus *Asperula* and nat. order *Rubiaceæ*, with whorled leaves, native of n. parts of the old world, and distinguished by a funnel-shaped or bell-shaped corolla, a bifid style, capitate stigma, and dry didymous fruit. The Sweet Woodruff (*A. odorata*) is common in shady woods in all parts of Europe. It has a creeping root, a stem 5-10 in. long, weak and sub-erect, four or five whorls of lanceolate leaves, 6-8 in the whorl, rough at the edge and keel, and small white flowers. The plant, when dried, has a very agreeable fragrance, similar to that of *Anthoxanthum odoratum* under similar circumstances. It forms an agreeable herb-tea, and enters into the composition of the popular *Maydrink* of the Germans.—DYER'S WOODRUFF (*A. tinctoria*) is a native of the continent of Europe and of Siberia, a perennial, with reclining stems about 12 in. long, whorls of 6 or 4 linear leaves, upper leaves opposite, flowers whitish. The root is used in Dalmatia and elsewhere instead of madder; but the crop obtained from a field is inferior in quantity to that of madder.—For flavoring, the Germans in this country use the SWEET-SCENTED BEDSTRAW (*Galium triflorum*), of the same family, and with odor much like that of Woodruff; it is procumbent, the fruit bur-like, with hooked bristles, the flowers in threes, greenish; it is common in woods that have a rich soil.

WOOD'RUFF, WILFORD: American Mormon leader: b. Northington (now Avon), Conn., 1807, Mar. 1; d. Salt Lake City, Utah, 1898, Sept. 3. He adopted the Mormon faith in 1833 and in subsequent years made missionary tours to England, and in the e. states. He was one of the Mormon emigrants to Salt Lake City; became one of the 12 apostles in 1839; and in 1887 was elected pres. of the Mormon Church. For 22 years he held a seat in the Utah Legislature.

WOOD'-RUSH. See LUZULA.

WOODS, *wûdz*, CHARLES ROBERT: soldier: 1827, Feb. 19—1885, Feb. 26; b. Newark, O.; son of Ezekiel S. Woods. He graduated at the U. S. Military Academy 1852; served on garrison and frontier duty to 1861; was in the attempt to relieve Fort Sumter 1861, Apr.; and in command of troops; was made colonel of 76th Ohio vols. 1861, Oct. 13; was at Fort Donelson, Shiloh, Corinth, and Vicksburg; was made brig.-gen. of vols. 1863, Aug. 4; and served at Lookout Mountain and Mission Ridge. He commanded a division in the campaign through Georgia and the Carolinas; was made maj.-gen. U. S. army 1865; was on the plains fighting Indians in the latter part of 1866; and 1874, Dec., was retired.

WOODS, KATHERINE PEARSON: American novelist: b. Wheeling, W. Va., 1853, Jan. 28. Her published works

include: *The Crowning of Candace; A Tale of King Messiah; From Dusk to Dawn; A Web of Gold; Melzerott, Shoemaker: A Protest against Social Injustice,* her strongest work; *The True Story of Captain John Smith* (1901); etc.

WOODS, LAKE OF THE. See LAKE OF THE WOODS.

WOODS, *wûdz,* LEONARD, D.D.: Congregational theologian: 1774, June 19—1854, Aug. 24; b. Princeton, Worcester co., Mass. In the intellectual atmosphere of his home he early became interested in philosophical questions. He graduated at Harvard 1796, and after studying theology was pastor in West Newbury, Mass., 1798-1808, when his articles in the *Panoplist,* defending Calvinism, led to his election to the chair of theology in Andover Seminary, which he held from the founding of that institution, 1808, to 1846, after which he was emeritus professor until his death, in Andover. He was also the presiding member of the faculty. While firm in the doctrines, he was fair and liberal in spirit. His collected works, in 5 vols. (1849-50), include discussions of Unitarianism, Perfectionism, Swedenborgianism, lectures on church government, on inspiration, etc. He wrote also, but did not publish, a history of the theol. seminary. His book of memoirs of Amer. missionaries was published 1833. He was prominent in the formation of the Amer. Tract Society, Temperance Society, and the American Board of Foreign Missions, on whose prudential committee he served a quarter of a century.

WOODS, LEONARD, JR., D.D., LL.D.: scholar: son of Prof. Leonard Woods, of Andover; 1807, Nov. 24—1878, Dec. 24; b. Newbury, Mass. He graduated at Union College, 1827, and at Andover Theological Seminary 1830, continuing his studies there three years longer, while assistant instructor of Hebrew, and collaborator with Prof. Stuart in commentaries and with Prof. Robinson in editing the *Biblical Repository.* At this time he published his annotated translation of Knapp's *Christian Theology.* He had been the foremost scholar in academy, college, and seminary. In 1834-37 he edited the *Literary and Theological Review* in New York, offending many of its supporters by objecting to reform societies and revival methods, and to the conditions often required for admission to Presb. and Congl. churches. He favored the so-called Oxford theology. After a professorship of sacred lit. in Bangor Seminary 1836-39, and a brilliant service as the pres. of Bowdoin Coll. 1839-66, he was commissioned to seek materials abroad for a history of Maine, and published 1868 the *Discovery of Maine.*

His health failing, his materials were printed by the Maine Hist. Soc. His addresses on several occasions were published. He died in Boston.—See memorial by Prof. Edwards A. Park (1880), and sketch by Richard H. Dana in the *Century Magazine* (1881).

WOODS, Margaret Louisa Bradley: English novelist: b. Rugby 1859. Her published works include: *A Village Tragedy* (1888); *Lyrics and Ballads* (1889); *Esther Vanhomrigh* (1891); *The Vagabonds* (1894); *Wild Justice* (1896); *Aeromancy* (1896); *Weeping Ferry and Other Stories* (1898); *Sons of the Sword* (1901); *The Princess of Hanover* (1902); *The King's Revoke* (1905).

WOODS, Robert Archey: American university settlement worker: b. Pittsburg, Pa., 1865, Dec. 9. He was graduated from Amherst in 1880, made a European tour for the purpose of investigating social problems, spending six months at Toynbee Hall (q.v.) and has been head of the South End House, a university settlement in Boston, from 1896. He is the author of *English Social Movements* (1891), and has edited *The City Wilderness* (1898); *Americans in Process* (1902).

WOODS, William Burnham: soldier and jurist: 1824, Aug. 3—1887, May 14; b. Newark, O.; son of Ezekiel S. Woods, who was a native of Kentucky, of Scotch-Irish descent. Woods graduated at Yale 1845, studied law at home, and began practice; was elected mayor of Newark 1856 and 7; chosen to the legislature, and was speaker 1858, re-elected 1859. He became lieut.-col. of volunteers, and served from 1861, Nov., to the close of the war, being almost constantly at the front, and in many battles. He became full brig.-gen. 1865, May 31. On leaving the army 1866, Feb. 17, he settled in Alabama as a cotton-planter and lawyer; became state chancellor 1868, United States circuit judge 1869, and justice of the United States supreme court from 1880, Dec. 22.

WOOD'S HOLL, *wûdz hōl:* village in Barnstable co., Mass.; on Buzzard's Bay, and on the Old Colony railroad; 4 m. s.w. of Falmouth, 20 m. e.s.e. of New Bedford, 71 m. s.e. of Boston. It has long been widely known as a harbor of refuge for shipping and as a delightful summer place for invalids, and in recent years has been the scene of important experiments in the propagation of sea-fish by the U. S. Fish Commission. It has a number of summer boarding-houses, a church, school, fertilizer factory, and regular steamboat-communication with Martha's Vineyard (7 miles).

WOODSTOCK, Canada: City and port of entry, co. seat of Oxford co., Ontario, on the River Thames and Cedar Creek, and on the Grand Trunk and Canadian Pacific railways, 49 m. s.w. of Hamilton, 29 m. n.e. of London. It has a large trade in grain, produce, and manufactured articles. The industries include manufactures of foundry and machine-shop products, bicycles, organs and pianos, wire mattresses, furniture, carriages, woolens, flour, etc. Woodstock is the seat of Woodstock College (Baptist), and has banks and daily and weekly

newspapers; lighted by electricity, has good water and sewerage systems. Pop. (1901) 8,833.

WOODSTOCK, Conn.: town in Windham co.; about 40 m. n.e. of Hartford and 5 m. n.w. of Putnam. It contains six villages. The town is in an agricultural and stock-raising region. The chief industrial establishments are creameries and cotton twine factories. It has Woodstock Academy, graded schools, and a public library. Woodstock belonged to Massachusetts when it was incorporated in 1690. In 1749 it was annexed to Connecticut. Pop. (1900) 2,095; (1910) 1,849.

WOODSTOCK, Ill.: City, county-seat of McHenry co.; on the Chicago & Northwestern railroad; about 50 m. n.w. of Chicago and 30 m. e. of Rockford. It is in an agricultural and dairying section. It has flour and lumber mills, creamery, pickle, and canning works. The principal public buildings are the county court-house, city-hall, and business blocks. It has six churches, Todd Seminary for boys, a high school, established in 1867, public elementary schools, and a public library. The three banks have a capital of $85,000. Pop. (1900) 2,502; (1910 est.) 3,000.

WOODSTOCK, Vt.: town, county-seat of Windsor co.; on the Ottaguechee river, and on the Woodstock railroad; 38 m. s. of Montpelier. It is in an agricultural and dairying region, and contains four villages. The chief industrial establishments are butter and cheese factories, sash, door, and blind factories, flour and lumber mills. Other manufactures are hay-rakes, sleighs, wagons, carriages, butter tubs, and cheese boxes. The town has six churches, graded grammar and elementary schools, and the Norman Williams Public Library, founded in 1885. There are two banks. Pop. (1910) 2,545.

WOODSTOCK, Va.: town, county-seat of Shenandoah co.; on the n. branch of the Shenandoah river, and on the Baltimore & Ohio railroad; about 95 m. w. of Washington, D. C., and 155 m. n.w. of Richmond. It was founded in 1762. It is in an agricultural and stock-raising region, and its industries are connected chiefly with farm and dairy products and the marketing of live-stock. It has eight churches, and graded schools for both races. There are one national bank, one private bank, and one loan and trust company. Pop. about 1,125.

WOOD-THRUSH, or WOOD-ROBIN: the most familiar of North American spotted thrushes (*Hylochichla mustelina*), famous for the rich four-parted melody of its spring song. It is numerous in warm weather throughout the Eastern States and Canada, inhabiting the wild spaces as well as confidently approaching the house and roadside. Its nest is often built in a village shade-tree, or even in a garden bush, but more frequently among the forking twigs of an apple-tree; and it is to be dis-

tinguished from that of the robin by the absence of mud and the presence of many dead leaves, which always form the principal part of its foundation. The eggs are deep blue, smaller and less greenish than those of the robin. It soon becomes unsuspicious of the persons whom it is accustomed to see about the place and who do not disturb it, but is jealous of the attention of other birds, and defends its home with admirable vigor and success. The song, which is heard most frequently and pleasingly toward sunset, is excelled by that of none of the more familiar Eastern birds either in musical quality or in sentiment. It is low, sweet, evenly modulated, and flute-like, yet has far-carrying power, and when heard at twilight across the fields, or from unseen recesses of the orchard, it brings to the mind a hymn chanted in praise of the serenity of the summer evening. This thrush is bright cinnamon above, brightest on the head; below white, with large rounded black spots forming lines down in front.

WOOD-WARBLER: a book-name for the small and beautiful American birds of the family *Mniotiltidæ* (see WARBLER); but the name is without special significance, as these birds are not more characteristic of woodland than of other places; nor than other warblers.

WOODWARD, CALVIN MILTON, PH.D.; LL.D.: American educator: b. Fitchburg, Mass., 1837, Aug. 25. He was graduated at Harvard University in 1860; was principal of Brown High School, Newburyport, Mass., 1860-5. During one year of the Civil War he was captain Co. A, 48th Mass. Vol., serving in Louisiana. In 1865 he was called to the Washington University, Saint Louis; elected professor of mathematics and applied sciences 1870; dean of School of Engineering 1871-96, and founder and director of the Saint Louis Manual Training School since its organization in 1879. Dr. Woodward's service to the cause of education has been marked by great devotion and by equally great success, especially along practical lines. He served as a member of the Saint Louis School Board 1877-9 and again since 1897; regent Missouri State University 1891-7; fellow and vice-pres. of the American Association for the Advancement of Science, 1903 and 1904; pres. of the Soc. for the Promotion of Engineering Education; member of the Saint Louis Academy of Science; past president Saint Louis Engineers' Club; was re-elected dean of the School of Engineering and Architecture July 1901. He is well known as a lecturer on Manual Training. Received the degree of Doctor of Philosophy from Washington University in 1883. He has contributed many valuable articles to educational and scientific journals and has written: *History of the Saint Louis Bridge* (1881); *The Manual Training-School* (1887; *Manual Training in Education* (1890); etc.

WOODWORKING.

WOODWORKING AND WOODWORKING MACHINES: operations and appliances by which wood is adapted to the various uses of house and ship carpentry, joiner-work, cabinet-making, etc. These operations include the squaring and cutting of timber, planing, jointing, chamfering, molding, bending, gaining or mortising, tenoning, mitring, etc., all of which were formerly performed by hand, but now largely by machines, many of them of great ingenuity of construction and nicety of execution. See CARPENTRY.

I. SAWING.—The Saw (q.v.) is an ancient and important implement for dividing hard materials by the action of cutting teeth, which form a narrow kerf as they disintegrate and remove a part of the material in the shape of dust. The ax and the chisel, also dividing tools, differ from the saw in this, that while they remove portions of the material on which they act, they do not disintegrate it along the line of their cut—that is, they produce no sawdust.

Saws may be classified in different ways: (1) By their mechanical disposition; (2) by the material which they are used to cut; or (3) by the power employed in operating them. Saws of the first class may be further classified as (1) reciprocating and (2) continuous. Nearly all *reciprocating-saws* are straight-bladed, and may be considered either as strained (kept stretched by a frame or other device at each end) or as unstrained (which are naturally stiff or have their backs reinforced by a stiffening piece, or are used to cut on the pull stroke only, and therefore do not require great stiffness). The typical *unstrained* reciprocating-saw is the ordinary hand-saw, by which is meant any saw used in the hand only, as distinguished from one driven by machinery. In this class are the ordinary carpenters' saws for cross-cutting and ripping, and the joiners' saws for tenoning, mitring, etc., the first having no stiffening piece on the back (indeed it is usually thinner on the back than on the cutting edge), and the second being reinforced by a back piece to prevent sidewise buckling. Most of the ordinary hand-saws used in this country cut only on the thrust or push stroke. Of the hand-saws, the rip-saw—whose teeth are arranged with comparatively wide spacing, have a vertical face and considerable set—cuts best lengthwise with the grain, and in soft woods; the cross-cut type—distinguished by smaller and more equilateral teeth, by closer spacing and less set—works best across the grain, in soft woods, and in hard lumber. Another type of unstrained saw is the muley- or mulay-saw, usually employed for ripping logs. It is always power-driven and cuts on the pull stroke only. When used for cross-cutting, it becomes a drag-saw. The use of blades strained by being held by both ends in a frame, or by some other equivalent device, permits employment of thinner blades, and practically abolishes difference between the push and the pull stroke. Strained reciprocating-saws are of all sizes from the small hand fret-saw, used in ornamental woodwork, and the metal-cutting or hack-saw, to

the ponderous affair used in saw-mills to square logs or to divide them into boards or planks. These saws may have in the frame either one blade, or many placed parallel so as to make several kerfs at once. The latter arrangement is called a *gang*. The jig-saw is suitable for working both outside and inside, and may have either a stationary or a tipping table. In the best makes the guides are adjustable, and may be varied in height to suit the thickness of the work; and the strain may be varied to suit the length of the saw. The machine is usually started and stopped by a friction clutch without belt-shifting, a brake stopping the crank-disk the moment the clutch is released. The gate-saw machine has a very wide and light sash or gate, reciprocating in vertical guides and bearing one narrow blade having a stroke of about five inches, with a 14-inch saw; working stuff six inches thick. This is for very wide material.

Of *continuous* or *continuous-acting saws* (i.e., saws which cut without alternation of stroke or speed) there are four principal classes: (1) The *circular-* or *disk-saw*, having the teeth on its periphery and in the plane of the disk; (2) the *barrel-* or *cylindrical-saw*, in which the teeth are on the edge of a hollow cylinder and project parallel with the axis of rotation; (3) the *band-saw*, in which a continuous ribbon driven by one pulley and driving another, after the manner of a belt for the transmission of power, bears cutting teeth on one edge; and (4) the *screw*, consisting of an advancing cylindrical or conical spiral, toothed on one edge in a direction radial to the axis of rotation. The *circular-* or *disk-saw* is of comparatively recent invention. It may be used either for ripping or for cutting almost any material, the teeth for each of these different classes of operation being of a shape, set, and spacing corresponding to those used by hand. Circular-saws are of all sizes from the tiny disk, no thicker than letter-paper, used in making the slits in gold pens and in gas-jet tips, to the six-foot disks, three-eighths inch and more in thickness, for ripping forest logs. Circular-saws may be arranged with only one on a shaft (or arbor, as the shaft is usually termed), or with two or more where parallel cuts are to be made; and in some cases two arbors are arranged parallel with the disks in the same plane, so that they cut a practically continuous kerf through much thicker material and with less waste than would be possible with only one saw. Where two or more circular-saws are on one arbor, they are called a *gang;* where two are borne on arbors lying in the same plane, so that they will cut a continuous kerf, the machine is called a two-high mill. Bevel circular-sawing machines may have either the saw or the table tip, as desired. Where the table is tipped, it can, in the best machines, be moved from the horizontal position through 45°, without altering the position of the saw with relation to the slot in the table. Where the saw is the adjustable element, the projection through the table may be altered to any desired extent, and the angle between disk and table may be from 45° to 90°. Circular-saw tables for ripping are usually furnished with ripping

gauges by which the width of the piece remaining after each cut may be accurately determined. In addition, it is well for many classes of work to have bevel gauges by which the angle of bevel to which a piece is slit may be predetermined and maintained. Circular-saw tables for cross-cutting may have cross-cut slides by which the length of piece removed may be fixed, and the work as well as the danger of feeding lessened. Saw-tables are now made almost exclusively of iron; and while many have their tops of wooden strips glued up, the best machines have accurately planed cast-iron tops, fitted with wooden throat pieces. In some circular-saw tables the saw-arbor is journaled at one end of a swinging frame provided with a handle and lock, by which the saw may be brought up through the table to any desired distance, according to the thickness of the material. Many circular-saw machines have boring attachments, a wood-auger being screwed to one end of the saw-arbor, the disk being allowed to remain if desired. Where there is a boring attachment, the saw-table has a bracketed shelf at right angles to the saw-arbor, on which the stock may be raised; and either the height of the bracket or that of the saw may be regulated by a screw and hand-wheel. This table has a sliding motion by which the piece may be brought up to the boring tool. Circular-resawing machines have vertical feed-rolls driven by strong gearing, and arranged so that, though ordinarily self-centring, they can be used for slicing, and set at any required angle for bevel-sawing. The swing-saw consists of a pendulum-like frame bearing at its lower end a circular-saw and journaled above in hangers. In the best makes the arm of the pendulum may be considerably lengthened or shortened to provide means for aligning the shaft, and for fitting to height both of the room and of the bench, as well as to diameter of the saw as it wears down. In most of them the saw-centre travels in a circular arc; but in one, instead of rising and falling in such a circular arc, the saw-arbor travels in a straight horizontal line, permitting a comparatively small saw to be used for wide and thick lumber, also enabling the use of a dado-head for grooving, gaining, rabbeting, tenoning, molding, etc. The parallel motion is obtained by a system of levers which compel the arbor to keep a right line. The braeket cut-off sawing-machine is a heavy cross-cut saw for cutting off large timbers used in car, bridge, and other heavy work. It consists of a long bracket which is bolted to a heavy plate, fastened to a wall or other suitable support, and can be raised and lowered to suit saws of different diameter. On this bracket the saw-carriage is mounted. The saw has a traverse movement over the table, through a hand-wheel. The table is a skeleton, bearing anti-friction rollers. The vertical cut-off saw consists of a stout column to the face of which is fitted a counterbalanced saw-carriage capable of being moved up and down by a treadle. The table has an adjustment to and from the column to suit different diameters of circular-saws, and a radial adjustment for angle-sawing. The same machine may be

used for gaining. Circular-saws may have their edges thicker than their centres, which is the usual custom and usually dispenses with the necessity of set; or they may have the edge thinner than the centre, as in veneer-cutting, in which the peripheral sectors are screwed or riveted to a central disk; or, lastly, as in those of small diameter and comparatively thin, the thickness may be the same all the way from centre to rim. As with hand-saws, these may have the teeth either spread-set or spring-set, according to the material. The cutting-speed of circular-saws varies. In ripping soft woods it may run as high as 13,000 ft. per minute at the rim, the teeth removing chips resembling those taken off by a chisel.

Cylinder- or *cylindrical-saws* range in size from those removing a disk an inch in diameter, used in the operation of trephining or trepanning the human skull, to those 2 ft. or more in diameter and 4 to 6 ft. in length, for cutting staves having curved sides. Their depth of cut is naturally limited by the length of the barrel, and this again by the degree of stiffness of the material of which the saw is composed, as one end must be in radial connection with the arbor.

The *screw-* or *spiral-saw* exists in but one class of machine, and that limited in application; its purpose being to cut the spaces between the tenons of the ordinary dovetail, as in box-making work. It is of English make and is mentioned here only for completeness of record.

Band- or *ribbon-saws* are coming rapidly into use, and would have been employed in greater numbers and for a greater variety of purposes had the makers of the blades been able to produce them of the length and quality to stand the exacting service demanded. As ordinarily made, the band-sawing machine has an upper and a lower pulley, of the same size; the lower one driven by a belt from any convenient source of rotary motion, and carrying an endless band or ribbon toothed on one edge, which serves the double purpose of dividing the stock and of driving the upper pulley. The pulleys (particularly the upper) are made as light as possible, so that when it is desired to stop the blade it may be done with the least practical resistance due to momentum. The lower one has a friction brake which may be applied to its inner rim-edge, so that when it is properly braked the only cause for continuance of motion of the blade is its own very slight momentum and the more considerable inertia of the upper wheel. Of course too sudden braking of the lower wheel would result in the band slipping on one or the other of the wheels; and as these are usually tired with leather or rubber to increase the driving-power, any such slipping would be apt to injure this tire, particularly if the teeth of the blade had any set. There is usually a device by which the shaft of the upper wheel may be canted so as to cause the blade to lead to one or the other edge, thus enabling the operator to keep it exactly in the central line of the tire of each wheel. There is also a provision by which, as the blade shortens by breakage and mending, the upper wheel may be brought

closer to the lower one. The tension of the saw is maintained in some machines by a spring and in others by a weight, the desired result being that the blade maintain at all times enough tension to keep it well to its work, and not enough to cause breakage; and that if a chip gets in between the saw and the wheel, there will be sufficient 'give' to prevent breaking of the blade. As the thrust of the stock in sawing, particularly if its rate of feed were high, would tend to throw the band off the pulleys, it is resisted by a back guide which is adjustable in height so as to be kept close down to the upper line of the work, which is usually fed along on a horizontal table. There are also side guides to keep the blade from swerving to one or the other side of the line of cut, as may be caused by a slight twist in the blade itself, or by an irregularity of motion of the piece being fed in, or by a knot, a soft place, or a hole in the material being sawed. Some band-saw guides take the pressure of the saw against two strips of steel held in place by a spring which enables them to be shifted from time to time. Others receive the thrust of the blade against cylindrical steel rollers which turn with the motion of the band; others, again, receive it on the bevelled edge of a hardened steel roller, the intention in using this form being to prevent grooving of the roller from use. Any rolling guide lessens the liability of the blade to crystallization. The rolling guides have the advantage that with them there is no danger of upsetting the back edge of the saw-blade. For heavy stock the table is supplied with rollers, as in some planing-machines. Logs, when sawed on a band-machine, are given their feed by a carriage, as in the case of the circular-saw. For a long time after the introduction of the band-saw it was used only in small sizes and for thin work, and especially for sawing ornamental patterns from several thicknesses of wood at once; but as the blades have been improved in quality and in size, and as users of the machine have understood how to handle them and to prevent accidents to the blade, to the material being sawed, and to the operator, the machines have been put to heavier and more important work, until now bands 60 ft. in length and 8 in. wide, travelling 4,000 ft. per minute, are at work almost in the backwoods, working into beams, planks, and boards the giants of the primeval forests. One make of log-band saw-mill has a log-carriage running on anti-friction rollers, and side supports so arranged as to secure an even thickness of the last board. There are rests at the same distance apart as the side supports, giving a decided advantage over ordinary mills in edging up boards and splitting plank into scantling.

One specially desirable use of the band-saw is in resawing stock already sawed by a circular or other type of sawing-machine. The extreme thinness of kerf which the band makes renders it very valuable in this class of work. As fitted for resawing, there are vertical rolls which feed and guide the material to and from the blade, friction on the bed being lessened by rollers projecting but slightly

above its plane. These rolls may be arranged so as to split the material down the centre or to one side thereof, thus making boards of equal or of unequal thickness, as desired. For ordinary band-resawing such a machine takes blades down to 24 gauge and up to 6 in. wide, sawing 16,000 to 20,000 ft. per day and making a kerf of only one-twentieth of an inch. In some makes, strong springs hold the rolls on one side to their work and enable them to yield to inequalities of thickness or shape, while the rolls on the other side form a guide in perfect line with the saw, thus making the cut parallel with one side of the stock. A band resawing mill with 72-inch wheels, and taking in lumber 30 in. wide and 13 in. thick, will cut in the centre of lumber 10 in. thick, or on the side of lumber 8 in. thick, or will take in a timber 13 in. thick and cut 5 in. on one side and 8 on the other. Such a machine will cut 5,000 ft. per hour.

While in most band-sawing machines the blade runs between pulleys one of which is directly above the other, and the blade hangs vertically, there are others in which, for bevelled sawing, the blade is inclined to the vertical. This is for many reasons better than inclining the table, as in the latter case there are two difficulties—one the tendency of the stock to slide out of place (by reason of its own weight), the other the risk of long pieces striking the floor or ceiling in cutting bevelling across the grain. With a horizontal table this is not possible. Some of the machines with inclined blades are so arranged that the blade-angle may be readily changed by moving the journal-boxes of one of the wheels in a circular arc centred at the axis of the other wheel, thus preserving the distance between the wheel-centres and the tension of the blade.

There have been made a few band-sawing machines which have two blades, each running on a separate pair of pulleys, the cutting sides parallel to each other, so that they can cut stock with parallel sides and curved outlines. The distance between the blades is regulated by the standard of one of the machines being movable along the bed-plate, so as to approach or to recede from the other standard.

II. PLANING.—*Planing-machines*—or, as they are called in common with the corresponding machines for metal-working, *Planers*—have for their principal object the smoothing and truing of surfaces, which should usually be parallel to the bed of the machine, and consequently with the opposite sides of the same piece of lumber which is being operated on: see PLANE. In the production of such plane surfaces three classes of machines are employed: (1) Those having slicing cutters, which act in the same manner as, though on a larger scale than, the irons of the ordinary carpenters' plane; (2) those having rotating cutters on arms at the end of an arbor at right angles to the plane surface desired to be produced; (3) those having rotating cutters on an arbor at right angles to the line of passage of the piece, but lying in a plane parallel to that which is desired to be produced.

In the first and third types there must be knives as long (at least) as the width which it is desired to plane at that

passing. In the second, the tools are only cutters somewhat similar to those used in a lathe for the rough cuts.

The first type of planing-machine is little used, except in Scandinavian countries, chiefly for working frozen lumber. There are several cutting blades placed obliquely to the length of the board, and each takes a slight cut a trifle deeper than the one before it.

In the second class, known as the Daniells machine, the material (usually heavy lumber) is fed along on a horizontal carriage, and the rotating cutters, which are borne on two horizontal radial arms at the end of a vertical arbor, project downward and cut in lines which would be circular if the material was not moving. While this type of machine does not do very smooth work, particularly at high feeds, it has the property of producing very true surfaces. It is usually employed in working timbers for car-building and other purposes where very long and heavy pieces are to be trued.

In the third class of wood-planing machines, ordinarily known as Woodworth or cylinder planers, and characterized by high speed of work, there is a rapidly rotating horizontal arbor bearing cutting knives and placed either over or under the piece to be planed. This may be passed along either by hand or by power, and may either be slid on a stationary bed or carried along (1) by a carriage to which it is rigidly attached, (2) by feed-rolls above and below, or (3) by an endless apron composed of stiff metal strips and travelling at right angles to the axis of the rotating cutters.

The first of these three modes of feed is not very common, though there are machines which use both the Daniells and the cylinder systems, and in which the piece being worked is always borne along by a carriage, whether the Daniells or the Woodworth head is employed. It has the disadvantage of requiring extreme length of machine and of taking up excessive room for the machine and the stick. For dimension-planing machines of the Daniells type it is well to have the feed-works on the under side of the main frame and below the table, to protect the machines from shavings and dust. A very desirable means of effecting the feed-motion is by friction disks, by which the rate of feed may be varied so as to move the table from 5 to 40 ft per minute either way. Such machines are also best made with their tables in sections which can be attached together as the length of lumber may require. Such tables are often of iron, covered with wood, and in such case may be trued up by lowering the cutter-head and taking a light cut from the wood. The feed-roll system is the most common, although it has the disadvantage that if the upper surface of the timber is untrue, the material may be fed in improperly, the high side or edge being fed faster than the low. Where the stick is light, one roll will suffice to slide it along the bed or table, particularly if there are rollers imbedded in the latter; but ordinarily there is an upper and a lower roll, which grip the piece before the cutters strike it. These rollers may be fluted lengthwise, in order to give them

a better gripping surface. Their action may be aided by feeding-out rolls, which grip the stock after it has been surfaced; though of course in this last pair the grooving or fluting must be dispensed with. To give increased grip without grooves, a rubber covering is sometimes used for the feed-out rolls.

In extra-heavy machines there are four heavy and strongly geared feed-rolls placed before and after the cutter-heads and close to them, so as to insure square work. In machines of modern design, the pressure feed-rolls are sectional, so that they can feed at the same time two pieces of unequal thicknesses. The feed-rolls are best driven with gears of greater diameter than the rolls themselves, thus making the strain on the teeth less than where both the gear and the roll are of the same diameter, and also insuring greater tooth-contact. Some planing-machines have an edge feed-roll for maintaining the lumber against the fence in a straight line while being worked. In some of the best machines for making flooring-boards there are six feed-rolls, the upper being smaller than the lower, securing easy entrance and delivery of the board as it passes in and out of the rolls, and avoiding the ridges sometimes seen on lumber, particularly where one board does not follow close to the one before it. In order that the same machine may work various thicknesses of stuff, the feed-rolls are geared together in such a way as to permit the distance between their centres to be varied without the teeth becoming unmeshed. For this purpose the kind of toothe-outline called 'involute' is best adapted. In many cases the pressure between the upper and the under rolls is effected by weighted levers, which admit of very rapid and effectual separation or approach of the feed-roll centres while preserving the proper pressure on the material to be moved. In surface planers it is well to have the pressure-roll so weighted that either end will work independently of the other, this being an advantage on unevenly sawed lumber. For wide surfacing it is well to have 'broken rolls' and divided pressure-bars, by which either one wide board or two narrow ones of unequal thickness may be planed. The machines are belt-driven, and their cutters run at a speed of from 4,000 to 7,000 turns per minute, according to the character of the material being worked, the softer woods permitting the highest rotation-speed and the fastest linear feed.

The third or endless-apron system is well suited for short pieces, which would require the feed-rolls to be inconveniently near the cutters, and which would also call for considerably more trouble on the part of the operator in engaging them between the feed-rolls.

With the cylinder system the cutters may be either over or under the stock, working either its upper or its under surface. Where the feed is by carriage or by endless bed, only the over-cutting system is permissible. Where it is by hand or by feed-rolls, it may be either over or under, or both at once. In this latter case one of the heads engages the stuff slightly in advance of the other. In all of the

systems the amount of cut may be regulated by screw or other devices, the journal-boxes of the cutter-arbors being adjustable up and down to an extent, and to a degree of fineness, to suit the demands of the operator and of the service, in the matter of depth of cut and thickness of material. In some endless-bed machines the bed or apron is composed of slats which are driven by sprocket-wheels which move the bed by the slats and not by the links which connect them. Some heavy endless-bed surfacers have delivery-rolls after the lower cylinder, feeding the lumber entirely away from the machine, and helping to relieve the strain on the travelling bed when feeding heavy lumber.

The advantage of the carriage-feed system is that the material is guided and governed by conditions entirely independent of its own surface, size, or shape.

In the best grades of cylinder-planers there are chip-breakers whose action is to keep the lumber from splintering. Usually the knives are parallel with the axis of the arbor which bears them, being slotted, and bolted on to a flat-sided head. In this case the marks which they make (as shown most plainly by deep cut and fast feed) are at right angles with the length of the stock. In other machines the knives are helical, thus making a draw-cut from one side of the piece to the other. This has the advantage of doing very smooth and even cutting, but the knives are difficult to sharpen, except by rotating emery or corundum wheels arranged to act on them without requiring them to be removed from their arbor.

Many planing-machines of the cylinder type have from two to four sets of cutter-heads, in the latter case dressing the material on all four sides; the side-cutting knives usually attacking it after those which work it on the upper and the lower surfaces. For flooring-boards there are usually but three sets of knives, dressing the stuff plane on one side, and working a tongue on one edge, and a corresponding groove on the other. In some machines the upper side is planed first, in others the lower; the latter method seeming to the writer preferable, as by it a smooth and true surface is prepared for the timber to move on while the other three sides are being planed. In some planing- and matching-machines the matcher-frames and spindles are dropped down to change from working flooring to plain surfacing; in others the alteration is made by removing the matcher-heads from the spindles, thus leaving the matcher frames and spindles always in working position and well supported, and keeping the boxes and journals in good condition. A jointing-machine for piano-work has a horizontal table bearing the piece, one side of which is to be made perfectly true; and the cutters are borne on the face of a disk with vertical face, so that the action of the machine is in effect that of a Daniells planer with horizontal instead of vertical cutter-head arbor. In some flooring-board planers the beading is done with a tool on the same arbor as the planing-knives, or by working the latter to the proper contour to perform this operation; but in the best machines the beading on both top and bottom is done

with separate cutter-heads, so that knives for beading and working 'novelty siding,' or making two floor-boards of one piece, can be placed at any point. The beading cutter-heads and matcher-heads are best placed between the first and the second pair of rolls, partly because, if the beading-cutters follow the surfacing-knives, they make a rough or ragged beading, and partly because, if the matching-heads are after the surfacers, and the board is not held as firmly as it should be to assure good matching and beading, one pair of smooth rolls will be inadequate to feed or deliver the board from the machine; also because, if the gauges are set a little too tightly when matching, the lumber will show the marks. In some machines the beading attachment is mounted in the pressure-bar over the under cylinder, allowing the depth of the bead to be gauged from the surface of the board. It is considered by some makers best that the pressure-bars should swing eccentrically to the cutter-bits, thus doing away with the chance of striking them. The 'buzz'- or hand-planer having a horizontal-axised cutter-head projecting slightly above a horizontal table and fed only by hand, has, in the best forms, a table parted at the cutter-head and adjustable, so that both parts may be in the same horizontal plane, or either may be raised above the other. Whether the two parts of the table are in the same plane or not, their edges remain close to the knives, irrespective of the depth of cut to which they are set; and in some, by a special adjustment, the tables can be set to plane slightly hollow; so that when work is glued up it will be extra tight at the ends and less liable to open. Such machines are usually provided with an adjustable square- and mitre-gauge; and should have a pressure-piece with a finger-protector for pressing stock against the gauge. The buzz-planer with the cutter-arbor and the adjustable table-tops vertical instead of horizontal, becomes a desirable edge-jointer and molder, enabling straight molding, tonguing, carving, jointing, etc., to be done without rigging up special guides; but its most important use is jointing the edges of wide boards, and in squaring up stock of various width and thickness. It is well that surfacing-machines for wide material have the cutter-arbor belted at both ends.

III. Molding.—The *Molding-machine* is but a development of the cylinder-planing and matching-machine, the desired outlines and cross-sections being given by knives of proper contour, borne on rotating cutter-heads, and arranged to work the material on one, two, three, or four sides, as desired. The feed is usually by rolls; those for feeding-in having, if necessary, corrugations or roughnesses to give them a good grip, and those for guiding the material out, and for relieving the feeding-in rolls, often being rubber-covered to prevent their damaging the surface of the finished molding. Where the molded surface is worked by cutters on horizontal arbors, the latter may be supported at both ends—in which case the machine is said to be an inside molding-machine; or at only one end, the other being free—in which case it is said to be an outside molding-machine. The latter arrangement is convenient, but, of

course, not quite rigid. Molding being ordinarily narrower than material which is to be planed flat, convenience of arrangement and use has made many molding-machines of the 'outside' type.

Two types of cutter are used with these machines: (1) One of even thickness throughout, and of such contour as will, at the desired angle of presentation to the material make the required contour of molding. This kind is difficult to sharpen so as to preserve the proper outline. (2) Cutters so grooved or hollowed on one side that by grinding them at a uniform bevel the desired contour may be given.

To effect economy in material, moldings are usually worked out of stuff of as little area of cross-section as will permit the required depth of concavity, so that the material fed to molding-machines is often triangular or trapezoidal in cross-section. This, of course, increases the difficulty of feeding the material, and of laying out the knife-outlines.

The edge-molding machine or shaper usually has a horizontal table through which projects a vertical spindle to which may be fitted fly-cutters of any desired outline, which work to the required contour the edge of the piece presented to them. Such a machine may do either straight or curved work, as for picture-frames. In all cases the height of the spindle above the table should be adjustable. An edge-molding machine which will also make corner blocks, rosettes, and dovetails has a vertical spindle holding a cutter, which projects through the centre of the table-top; the stuff may be clamped in a cage which has traverse in all directions in the horizontal plane, so that rosettes may be cut. The same machine will work patterns on long strips.

So great is the precision of work attained by these machines, both planing and molding, that for most purposes no sand-papering nor other dressing is required; the speed of the cutters being so high, and their cuts so close together, that they produce a practically continuous smooth surface. Where, however, it is required to give a specially smooth and glossy surface, sand-papering machines are employed (see below).

IV. Gaining.—*Gaining-machines*—or *Gainers*, as they are often called—are used for making rectangular grooves in the face of timber, usually at right angles to its length, and usually also extending all the way across its width. While these 'gains' are generally comparatively narrow, they may be, as in the case of passenger-car uprights, recesses to receive a truss-plank of considerable width, being, in the instance just cited, wider than they are long; width being counted (in the case of right-angled gaining) in the direction of the length of the piece, and length being considered as in the direction of the cut, or at right angles to the length of the piece grooved.

Gaining (also called grooving and dadoing) may be effected by two classes of tools: (1) Rotating cutters having a cutting width equal to that of the desired groove; (2) thick saws set at an angle to their axes, so as to have a wabbling

motion, and which make a shallow kerf wider not only than the thickness of the plate of which they are made, but also than any degree of set would cause them to make. The former type is the more common.

In gaining-machines either the cutter-head or the stock may be given the desired traverse. Where the work is light, it is usually more convenient, and gives truer work, to move the stock instead of the tool; but where it is very heavy, as in car-work, it is better to give the cutter-head the motion, and not to move the stuff after it is clamped for each cut. Where several gains of the same width and depth, and equally spaced, are to be made, it is well to have stops by which the distance between them may be regulated, and to feed the work (or the cutter-head, as the case may be) across at each setting. For light work the cross-feed is by hand; for heavy work, by power. Where many gains are to be made close together in one piece, it is well to have two or more cutting-heads. To avoid the necessity for a great number of cutters of different widths, often fractional, there have been devised a number of extensible or variable gainer-heads, in which there are two or more sets of cutters, which may be so arranged that all of them cut to their exact width, in the same line, or else that some of them cut one-half of the width of the gain and others the other half; so that cutters an inch wide may make gains of any fractional width from one inch to two, inclusive. A dado-head, grooving-head, or gaining-head is best made with scoring-knives to clean the way for the cutters, thus making 'sweeter' work than where the flat or routing cutters which work between the scorers are their own side gauges. For these last there may be substituted formed knives for moldings, pilasters, and other work, as well as for tenoning, rabbeting, etc.

V. Tenoning.—The operation of *Tenoning* may be performed by two separate classes of machines: (1) Those using circular-saws, which cut, from the stick, blocks of such size and shape, and from such places, as will leave the tenons standing where desired; the only disintegration of material being along the kerf-lines. (2) Those having rotating cutters, which completely disintegrate the material cut away. The first class of machines usually consume less power than the other, but as the walls of the kerf left by even the finest-toothed and sharpest saw, with the slowest feed, are not so smooth as the cut of a rapidly rotating knife, tenons made by saws are not so well finished as those made by cutters. Further, saws cutting away blocks are limited in their action to single tenoning, while cutters may be made to leave standing two, three, or more tenons, of different lengths, thicknesses, widths of shoulder, etc.

For doing ordinary single tenoning by circular-saws the machines usually have two saws on the same axis, their distance apart practically representing the thickness of the tenon to be left. The end of the stick being passed over these, there are made two parallel kerfs representing the sides of the tenon; then two saws on parallel arbors, their disks lying in the same plane, and their rims at a distance apart

representing the thickness of the tenon, remove the outside blocks and leave the tenon standing. For such work the thickness of tenon can be regulated only by varying the thickness of the distance-piece between the parallel saws. The width of the shoulder on each side of the tenon may be varied without changing the tenon-thickness, by presenting the stick more to one side, or to the other; thereby making one shoulder or the other the wider. Where it is desired to make one cheek of the tenon longer than the other, the two cutting-off saws cannot be in the same plane, but must be moved so that both their arbors and their disks are parallel, but the latter are not in the same plane. In machines of this type, while the length of tenon cannot quite equal the distance from the collars of the slitting-saws to their rims, and the width of the shoulder cannot quite equal the same distance on the cutting-off saws, this limitation is no bar in practice.

Tenoning-machines using saws for removing blocks may make tenons having their sides parallel with those of the stick, and their shoulders at right angles to the length of the stick, by presenting the stick at the desired angle to the disks of the slitting-saws; and if it be desired to make the shoulders oblique, with the sides of the tenons either parallel or inclined to the length of the stick, this may be done by presenting the stick at the desired angle to the cutting-off saws. In making the ordinary single tenon by rotating cutters, the latter may be mounted and presented in various ways. One way is by cutters having their axes at right angles to the length of the stick, the width of the cutter properly being equal to or little greater than the desired shoulder-width. With one cutter, one face of the tenon may be finished at one passage, and the other finished by a second cut; or two cutters may be mounted on the same axis, at a distance apart equal to the desired tenon-thickness, and the work done at one pass. One machine for forming single or double tenons on both ends of long pieces without turning them about has a horizontal cutter-head arbor at right angles to the table on which the stick is clamped. This head may be raised and lowered, so as to pass through the end of the stick while it is clamped at one end of the table; the stick then being slid lengthwise and again clamped, the head is traversed in the opposite direction to that which it was given in making the first tenon.

In another type of cutter-head machines, the head is on an axis parallel to the length of the stick, but not in line with the stick itself; and instead of comparatively thin cutters, such as those required in the type just described, there are, properly, knives of a width equal at least to the length of the tenon, their length, also, being equal at least to the width of shoulder. With one axis bearing one cutter-head, one side of the tenon may be finished at one pass, and the other may then be done by another pass. By having two arbors, each bearing a cutter, and placed parallel to each other and to the length of the stick, the single tenon may be cut by one pass, each head making one side. It is evident that cutter-head ma-

chines having arbors parallel to the length of the stick cannot make double or treble tenons; but that by increasing the number of cutter-heads on the single arbor placed at right angles to the length of the stick, any desired length, width, or spacing, or double, treble, or quadruple tenons, may be secured. Inclined tenons may be made on either type of cutter-head machine, by varying the angle of the cutter-arbor in relation to the length of the stick. A strong tenoning-machine with a carriage mounted on rollers, for heavy work, has for single tenoning two horizontal spindles; and where double tenoning is desired, a vertical spindle with cutters acting between the others is added.

VI. MORTISING.—*Mortising-machines.*—Mortises to receive tenons may be made by two kinds of tools, reciprocating and boring—that is, either by chisels or by augers. In some cases the boring tool is employed to remove most of the material, and the chisel is then brought into service to square the outline. For ordinary work which is not of great dimensions, there are employed stiff reciprocating chisels which start at one end of the mortise and work toward the other. The tools themselves usually are of ⌐¬ section above, the sides tapering away so as to leave the lower cutting edge only a single straight line. Such a tool will cut away the material without splintering at the edges. Some chisels of this type have a jagged or ratchet-like inner surface which enables them to withdraw the chips which they make, instead of packing them and clogging the mortise. While a chisel will work without the aid of any other tool, it is usually advisable, if the mortise is to be of any size, to leave the chisel as little work as possible to do, other than merely squaring and smoothing the walls of the hole.

Mortising-machines for this class of tool usually bear the work on a table which may be raised or lowered at will by the operator, and thus brought into or taken away from the cut of the chisel, which reciprocates vertically, positively, and continuously. The table also has sidewise traverse, so that the entire length of the desired mortise may be brought under the tool, and has in addition a forward and backward traverse to enable the tool to cut a mortise wider than itself. These machines are simple and can run at high speed. In some machines the stroke of the tool is variable; this being effected (1) by its attachment to a pitman, the rotating pin of which may be fixed at any desired distance from the centre about which it revolves, thus varying the length of the crank-arm; (2) by the use of a toggle, by which the chisel may be given either all or only a portion of the length of throw of the crank —this second class of variations being effected while the machine is in motion. Machines having a graduated stroke, the motion being produced by lengthening the connection between the crank-shaft and the chisel-bar, starting from a still point, do well in heavy work or where the table attachments are too heavy to be lifted by the operator.

In some machines the boring tool is made to do the prin-

cipal part of the work, and instead of the chisel which cuts on only three sides there is employed one having a square outline, but each cutting edge of which is slightly concaved, so that it makes a draw-cut from each corner. Where, as is usually the case, the mortise has a larger area than that of this clearing chisel, each stroke of which leaves a finished surface, the material is traversed, so as by repeated cuts to clear the entire desired area, leaving the walls smooth and true by reason of the drawing-cut of the clearing tool. Machines in which the chisel-bar has a hollow chisel, and augers with progressive forward movement to the required depth of mortise, the action of the auger preceding that of the chisel and working the mortise to its full depth at each stroke, are best for heavy timbers, as in bridge and car work.

In some machines, instead of the greater part of the stock being worked away by making a succession of auger-holes, cutting only with their ends, the rotating tools cut principally with their sides, being in effect routing-tools; and in this case the material is given continuous traverse, so that the tool cuts from one end to the other of the mortise-lines. Those machines in which the mortise is formed by a rotating traversing bit, cutting on the side as well as on the end, are especially suitable where there are many pieces to be made exactly alike, as in chair-work. Blind mortises, or those which do not extend clear through the thickness of the material, may be made by any of the machines above described, but the bottoms of the holes will not be smooth unless there is used a special routing-tool; and even in this case the corners cannot be perfectly clear.

VII. Dovetailing.—*Dovetailing* is a species of tenoning, but in dovetails proper the tenon has its free end wider than that which is attached to the stick. In the dovetail-joint there are usually a number of such tenons standing side by side on the side, edge, or end, of a piece, as a board; and usually the mortises in each piece are the exact counterparts of the tenons between which they are made, the mortises of one piece interlocking with the tenons of the other, so that the same cutting tools may be employed for the fully projecting tenon on one piece and the side-bearing tenons of the one with which it engages. This, however, is not always the case, as the end-tenons will often be quite wide, with narrow spacing, and the side-bearing tenons will be narrow, to correspond with the spacing between the end-tenons. Such tenons are produced: (1) by rotating cutters of the 'fly' type, having their free ends larger than those which are attached; (2) by the spiral or helical-saw, briefly referred to under the head of Sawing (see above).

A species of false tenoning is produced by working on the end of one piece, parallel with its length, cylindrical pins or dowels around which the material has been routed away so as to leave an outline of a circular arc. The end of the corresponding piece is worked in a scalloped outline, the centre of each scallop being bored to receive one of the

dowels which project from the end of the other piece. The dowelled parts are cut with a 'fly' cutter; the scalloping is done usually by side-cutting knives.

VIII. TURNING or LATHE-WORK.—While the Lathe is not so markedly in the lead in woodworking as in metal-working machines, yet in its various forms it has an importance which renders it nearly indispensable. Its principal use is the production of objects having circular cross-sections with symmetrical outline, though in its modifications it produces articles of any desired cross-section and contour.

In its original form, the principal feature—from which it takes its name—was a flexible lath or other piece of wood fastened at one end and having attached to its outer and free end a cord which was wrapped about the article to be turned round. This, being placed horizontally in the crotches of two vertical forked uprights, was given rotation in one direction by means of a cord attached to the flexible lath, and in the other by a similar cord from a treadle-piece. The application of a hand cutting-tool to a piece rotated in such manner gave it the desired form, every section being circular. From the motion given the piece while being so worked came the word 'turning.'

A development of this primitive turning-lathe was to attach the piece being worked to a head, which was given rotation by a cord and treadle, and cord and flexible lath; and later by a treadle and crank, driving a band-wheel from which a cord passed over a pulley on the rotating head to which the piece was attached; the other end of the piece being (in either of the two instances last mentioned) free to turn on a cone-centre or its equivalent. In all cases the tool was guided by a rest, which might be slid lengthwise with the axis of the piece to enable the tool to attack any desired portion of the length, and might also be approached to or drawn away from the axis of rotation to enable the piece to be worked to any desired diameter at any portion of its length. Improvements in the ordinary turning-lathe have been in the line of giving the live-head, or that to which the article is attached, variable speed, and driving it by power; also in the manner of 'chucking' or holding the piece. The first chuck was merely a centre-piece having a forked centre, the prongs of which engaged in the end of the piece to be turned. For some kinds of work, as ball-turning, this was impracticable, and the cup-chuck, by which the finished part of a sphere might be held while the rest was being operated on, was evolved. The hollow spindle, which permitted the turning of pieces much longer than the distance between the live- and the dead-centres of the machine, was an advance which has been appreciated by woodworkers everywhere.

The face-lathe, permitting the turning of articles of great diameter and short length, such as disks, holds the material on a face-plate which overhangs the frame of the machine, and by its use the only practical limit to the diameter which may be worked is the distance between the axis of rotation and the floor or other obstruction.

The gap-lathe, while not so common in woodworking as in metal-working, combines the features of the face-lathe with those of the ordinary type, having in the bed a depression or goose-neck by which long articles requiring support at both ends, and having considerable diameter at one portion of their length, may be turned.

In all the above-mentioned machines the tools are stationary, and the high cutting-speed desirable to give smooth cutting and large output is obtained by high rotation-speed of the material itself. This, however, has the disadvantage that the cutting-speed is greater at those parts of the object remote from the centre, than at those near the axis of rotation; and there are certain classes of work which cannot be done in this manner. A further development was the use of rotating cutters driven by a separate belt, and turning either in the direction of motion of the article being turned, or in the opposite direction, or lengthwise therewith; the cutters having high speed and the article itself turning but slowly, so as to present successive portions of its periphery to the cutters. In the Blanchard lathe (named after the inventor) the cutters have a high-speed rotary-motion only, and the material to be turned has a slow rotating motion, also a lengthwise traverse and an upward and downward movement which is governed by a former of the desired shape, though it may be larger or smaller than the article to be turned. The axis of rotation of the former is in line with the axis of the article, and both are in a movable frame. The former rests on a wheel, and, as it rotates, causes the whole frame to rise and fall as the inequalities of the surface of the former rest on the wheel, thus causing the copy to approach or recede from the cutters in an equal degree—a slow lengthwise traverse being kept up at the same time. Such a machine can turn out 200 axe helves per day, and can also turn gun stocks and more irregular articles having elliptical, oval or other non-circular cross sections. In the gauge-lathe, the material to be turned rotates at a high speed, while the knives have a comparatively slow lengthwise traverse, and the finishing knife has also an upward and downward motion, regulated by a pattern screwed to the bed of the lathe. This lathe will turn over 2,000 broom handles a day, and other articles having a round cross section. In the back-knife lathe the cutting tool is a long knife with its length diagonal to a rectangular vertical frame which has a slow vertical motion, the knife thus forming a shearing-cutter, acting with successive portions of its length on the rapidly rotating material; if the knife is given other than a straight cutting edge it will give a corresponding outline to the piece produced.

IX. Boring and Boring-machines.—Machinery is applied to driving the usual types of boring-bits, for two reasons—the greater speed and range of work possible, and the greater attainable accuracy of the holes bored and of their spacing. In the mere application of power of turning a boring tool there is little or no invention required; but in the production of machines for doing special classes of

work rapidly and with precision, builders of woodworking machinery have distinguished themselves.

A very useful type of boring-machine consists of a single spindle bearing on its lower end a boring-bit, arranged with a lever so that it may be depressed to bore into work below it, and withdrawn by a spring when the lever is released. For piano-action work there is a type of boring-lathe (so called) which has a slide-rest with vertical, lateral, and lengthwise adjustment, and capable of being swivelled to any angle, and placed either lengthwise or crosswise on the shears. For end-boring car-sills and similar work there is used a radial reversible car-borer, which will bore at any angle in a horizontal plane, or, by proper adjustment, at any angle in a vertical plane. The boring-spindle runs in a revolving frame, and will reverse so as to bore in either direction, to right or to left, and can be moved to any angle up to 90°. A multiple- or gang-machine for boring a large number of holes at one operation, without laying them out, carries four to eight spindles, which run in frames gibbed to a connected gateway and vertically adjustable by a screw to each. There is below the machine a drum over which there wraps a continuous belt which drives all the spindles without the necessity of an idler for every one. When the spindles are set at the proper height and distance apart, no laying out of the work is necessary. A three-spindle vertical car-boring machine has horizontal traverse for the spindles; the timber is borne on a roller-table having geared rollers arranged to run in either direction, moving it either to right or to left. A three-spindle horizontal boring-machine has quick independent vertical-power adjustment, to avoid the frequent changing of augers; the timber is moved on a roller-table by a fluted roller turned by a hand-wheel. Some boring-machines, suited especially to mortising, and adapted also to rosette-cutting, have a horizontal spindle in a steel tube, with which it rotates and in which it slides, thus preventing the difficulty that arises from spindles which slide in the same bearings in which they rotate, of becoming smaller at one part than at another. One class of boring-machine has two horizontal spindles, which may be set in the same horizontal plane, or in a plane at any angle with the horizontal. Its table slides forward, backward, and sidewise. One of the bits is removed when only single boring is desirable. This machine may be used for both boring and mortising, producing mortises with half-round ends, using in this case a rotating tool which cuts with both end and side. A very useful vertical boring-machine has three spindles bearing different-sized augers, so that all the holes in ordinary framing may be bored at one handling and setting. The spindles are differentially geared as to speed and power, to suit large or small augers.

X. Carving and Carving-machines.—There are three kinds of machine to which the name *Carver* is given: (1) Machines which merely rout in plane or approximately plane surfaces; (2) those which reproduce patterns of any desired complexity of outline and relief; (3) those which

do complicated turning, as in making spiral posts, plain or intertwined.

Machines of the first kind work with plain rotating tools gauged to cut the desired depth, and cut principally with their sides. Such tools are usually mounted on swinging jointed arms such as are employed in sand-papering machines, so that they may be presented to every square inch of the surface of the material. In this case the track cut by the tool may be entirely governed by the operator's eye or hand, or the tool may be compelled to cut in an outline determined by a former. Such machines are, strictly, routing-machines, but very little developed from those employed to work away to a slight depth the comparatively large areas of material in relief-engravings not desired to receive ink or make an impression.

Carving-machines of the second kind also employ routing-cutters, but these nearly always act in connection with a pattern which is best made much larger than the desired copy, and of metal—a tracing-point going over every portion of the area of the pattern, causing the rotating tool to cut to a greater or less depth according as it is raised to a less or greater degree by the protuberances of the original; and the operator is usually depended on to see that every portion of the area of the original is visited by the tracer, which of course necessitates that corresponding portions of the copy shall be made. Of course by this machine the material cannot be spoiled by carelessness of the operator, because the tool cannot be made to cut deeper in any one place than the corresponding depth on the original would warrant. Such machines are often furnished with several cutters, all governed by one tracer, and, if the pantagraph system is properly carried out, may make all the copies of one size, or some of one size and others of one or more different sizes.

The third kind of machine, for making 'twist-work,' will turn not only a spiral of circular, elliptical, or oval cross-section, but two such spirals intertwining, either parallel, tapered, or curved. In the best-known machine of this type the cutters are similar in shape and arrangement to those on variety-shapers, and are so held between collars that they cut from the outside in, making a smooth cut, even against the grain. They rotate in the same direction for cutting either right or left handed.

In this twist-machine (Pryibil's) the work is held between centres, as on a wood lathe, but the head-stock is arranged to turn slowly, as the bed carrying the heads is moved lengthwise by a hand-crank at the front of the machine. The rate at which the work rotates in relation to the travel of the bed, and which determines the pitch of the twist, is regulated by change-gears, much as on a machinist's screw-cutting lathe. The gears, which mesh with a fixed rack, are only for rotating the work as the bed is moved lengthwise. The rack is double (cut on back and front), and by placing the gear on one or the other side thereof, the twist is cut right or left handed. The relative speed at which the work turns makes it long or short pitch. The frame on

which the bed rests is so pivoted centrally to the main frame as to swing in a horizontal plane, but can either be fixed at any desired point or left free to swing, for an object explained below. Just back of the work, at the height of the cutters and above the pivot on which the frame swings, is a head carrying four cutters (two right and two left handed) similar to the bits for a variety-molder, and held by somewhat similar collars, but set at an angle so as to make a shearing cut from outside in, thus enabling cutting against the grain without splintering the work or making it rough. These cutters are carried on a spindle held in a frame supported by a horizontal shaft in the same horizontal plane as the centres carrying the work. This shaft is perpendicular to a line connecting the cutters. The spindle-frame can be swung around this shaft to give the spindle any desired angular position in a vertical plane, to enable the cutters to fit the spiral of the twist, either right or left. The centre of the cutter-head, however, never changes its position, being in the axial line of the shaft.

The spindle and its frame are balanced in all positions and can be secured at any desired point. They can be moved forward and backward, to and from the work, to give requisite depth of cut on work of various diameters. When a tapered shape is to be worked, a flat wooden form of the proper taper is arranged to move back the spindle as the bed moves lengthwise, and the bed is swung around, as before described, and fixed at the proper angle to fit the taper. The spindle-frame is weighted to keep it against the form. When curved or variable tapers are to be cut, two forms are required—one to move back the spindle, the other to vary the swing of the bed as the taper changes. When two or more cuts are to be made on a single piece, the work is revolved through a fraction of the circle by a dividing head independent of the lengthwise motion of the bed; then another cut is taken, and so on. Small sticks are supported in a wooden block bored to fit them, and through which the cutters cut to the work.

XI. Veneering.—*Veneer-cutting machines* are of three classes: (1) Those employing saws, and with some of which, particularly with very thin sheets, the kerf-waste weighs more than the finished product; (2) those slicing the log or balk by long knives, which, of course, lose no material in this way, and which show the grain of the wood in the same manner as saws do; (3) those turning from the log (previously made perfectly cylindrical) a continuous ribbon extending from the circumference to a very small core, which is wasted only so far as veneer-cutting is concerned. With this last machine the pattern presented is different from that shown by knives and saws, though it possesses a beauty peculiarly its own. This machine, while wasting no stock in kerf, has the disadvantages of requiring much of the bulk and weight of the log to be turned off before the knives can work on it, and of limiting the width of the sheet in the direction of the log's axis. By the second system the width of the sheet is fixed by the width of the log itself. With the third class of machine the limit is only

in the length of knife which can be kept in order and properly worked. There are some machines which, while not applied to making veneer, or costly and beautiful woods for covering baser material, still have the same function—that of removing slices of wood—and the same methods of operation. Some of these are for making thin, flexible wooden sheets from which to make berry-boxes, baskets, and the like; and these are usually supplied with knives, by which the stock is cut into small sheets, sometimes of the exact shape required to make the desired article, and all ready to be bent into the required shape. A later development of the second class of veneer-machines is in its employment for cutting boards from logs. This machine, brought out 1891, takes a log of full size as received, say, from the raft, and slices it lengthwise into boards half an inch in thickness, and as wide as the log itself; the knife being a massive affair and fixed directly to the piston of a steam-engine. Of course such a machine as this can have charged to it none of the losses due to kerf-waste.

XII. SAND-PAPERING.—Each year the list of articles which may be finished by sand-papering and kindred machines as well as or even better than by hand, increases. At first machine-work was applied only to plane surfaces of considerable extent, and these were treated while in a horizontal position by rapidly rotating horizontal disks covered with sand-paper, and borne at the end of pointed arms which permitted the action of the disk to be extended to any part of the wooden surface and at the same time prevented local scoring. Such articles as ax-handles, etc., which had surfaces of but slight extent in one direction, and more or less irregular, were treated by endless leather or canvas belts coated with glue and then sprinkled with sand or emery, and allowed to dry; these belts being run between pulleys in the same manner as an ordinary driving belt, and having sufficient flexibility to enable the work to be well done in concavities as well as on convexities of the surface. While these early sanding-disk and sand belt machines are still used, perfected in detail, for large flat work, they have been supplemented by others in which are large horizontal drums but slightly projecting through suitable apertures in the table along which the work is fed. In the best of these machines the drums have lengthwise traverse as well as rapid rotation, thus doing away with scoring. In some machines there are two to four such drums, acting one after the other on the surface to be smoothed, each being clothed with a finer grade of sand-paper than the one before it, and the last being known as the polishing drum.

Another type which has supplemented the machine with a horizontal standing-disk at the end of a jointed arm has two opposing vertical disks, the horizontal distance between which may be accurately gauged, and

which are used to dress both sides of such articles as drawers, which may be finished to accurate gauge as well as to good surface.

In one type of sand-paper machines there are rubber-covered tapered drums on which moistened sand-paper is slipped. The same horizontal spindle bears a horizontal drum covered in the same way with the paper, and projecting very slightly through an opening through the table. Sand-paper used on such a machine has every grain brought into contact with the work, and has better opportunity of being freed from dust than when used on disks. One type of sander has not only the horizontal tapering and cylindrical surfaces, but a vertical drum projecting through the table, so that both straight and curved work can be done, preserving square corners. The vertical drum has vertical motion so that the full face may be used on shallow work, and the formation of ridges or grooves be prevented.

XIII. Dowelling.—One class of work of increasing use is for making dowels, or straight cylindrical rods, e.g., those used as hammer-sticks for piano-actions. One type has on small sizes a single L-shaped knife, and on large sizes one for roughing and one for smoothing the cut. In all the rod passes through a rapidly rotating spindle. In many there are feed-rolls for passing in the stock; and they should be capable of being instantly stopped to avoid a knot or other defect.

XIV. Wheelmaking.—The wheelwright's province has been invaded by machines which do his work with a rapidity and precision leaving little, if anything, to be desired, and in most instances far surpassing hand-work. Not only are the principal parts of the wheel—the hub, the spoke, and the rims or felloes—each made by separate machines, most of them special, but they are assembled also by machinery.

For making the hubs there are required lathes which produce the general barrel-shaped form, boring-machines which make in it the hole to receive the skein, and mortising-machines which make in it the equally spaced mortises. The spokes are turned by automatic copying-lathes of special make, and tenoned and throated by machines for that particular purpose. The rims or felloes are either sawed out by hand or dish saws, or, while subjected to the action of steam, bent to the required curve by powerful machines. They are mortised to receive the tenons on the end of spokes. Both the spokes and the felloes or rims are smoothed by sanding-belts. The spokes are driven into the hubs by machines which simulate the action of a hammer wielded by the human arm, and are sawed to equal length, while they project from the hub, by machines specially constructed for that purpose. The rims or felloes are forced on and held in place by special machines.

WOODWORTH, *wûd'wėrth*, Samuel: American au-

thor and editor: b. Scituate, Mass., 1785, Jan. 13; d. New York, 1842, Dec. 9. He received a limited education in his native town, and was apprenticed in Boston to Benjamin Russell, editor and publisher of the *Columbian Centinel.* After the expiration of his indentures he published for a brief period at New Haven, Conn., the weekly *Belles-Lettres Repository.* He was one of the founders in 1823, in conjunction with George P. Morris, of the *New York Mirror,* from which he withdrew within a year. Among his writings were a number of dramatic pieces; *Champions of Freedom* (1816); and several songs and miscellaneous poems, one of which, *The Old Oaken Bucket,* obtained a wide popularity.

WOO'ER, WOO'ING, etc. See Woo.

WOOF, n. *wôf* [from *weave,* which see]: the weft or cross-threads in weaving; the thread that is carried by the shuttle and is woven into the warp or lengthwise threads; texture; cloth. Woof'y, a. *-ĭ,* resembling the woof; having a close texture.

WOOL, John Ellis, American general: b. Newburgh, N. Y., 1789, Feb. 20; d. Troy, N. Y., 1869, Nov. 10. He was in early life proprietor of a book store in Troy, and his property being consumed by fire, he turned to the law, but his studies were interrupted in the war with Great Britain in 1812, when he became captain in the 13th infantry. He distinguished himself at Queenstown Heights, Plattsburg, and Beekmantown, and in 1816 was appointed inspector-general of the n. division; in 1818 lieut.-col.; in 1821 inspector-gen. of the whole army; and in 1826 brevet brig.-gen. for 10 years' faithful service. In 1836 he was charged with removing the Cherokee Indians to Arkansas; and in 1838, during the Canadian difficulties, made a reconnoissance through the wilds of n. Maine, with a view to the defense of the frontier. He was appointed brig.-gen. 1841, June 25, and at the commencement of the Mexican war was ordered to the West to organize the volunteers, 1846, May 30, and in less than six weeks despatched to the seat of war 12,000 troops fully armed and equipped. He selected the ground on which was fought the battle of Buena Vista, 1847, Feb. 23, commanded in the early part of the action, and for his conduct on this occasion was brevetted a major-general in 1848. After his return home in July, 1848, he commanded the eastern military division until October 1853, when he took charge of the department of the East. From 1854-57 he commanded the department of the Pacific and the Eastern department again 1857-60. When civil war broke out he was sent to Fortress Monroe as commander of the department of Virginia, and from that post led an expedition which occupied Norfolk, 1862, May 10. He was promoted maj.-gen. in the regular army, 1862, May 16, and retired in 1863.

WOOL, n. *wûl* [Goth. *wulla;* Icel. *ull;* Dut. *wol;* Dan. *uld;* Ger. *wolle*, wool: L. *villus*, shaggy hair: Gr. *oulos*, woolly]: the soft fine curly hair which covers the sheep and some other animals; any fine fibres resembling those of wool—the difference between *wool* and *hair* is, that the former is capable of felting on account of its rough edges, while the latter is not. WOOLED a. *wûld*, having wool, as fine *wooled*. WOOLEN, a. *wûl n*, made of wool; consisting of wool; pertaining to wool; in *OE.*, behaving like a rough dressed peasant; coarse. WOOL LY, a. *-li*, resembling wool; clothed with wool or with a down resembling it. WOOL-LINESS, n. *-nĕs*, the state or quality of being woolly. WOOL'-COMBER, one whose business is to dress and comb wool. WOOL'-DYED, a. dyed in the form of yarn or wool before being made into cloth. WOOL FELL, a skin which still retains its wool. WOOL'-GATHERING, n. idle indulgence of the imagination, causing neglect of present matters: ADJ. indulging in idle dreamy fancies; listless. WOOL-GROWING, a. producing sheep chiefly for the sake of their wool. WOOL'-GROWER, a person who raises sheep chiefly for the production of wool WOOL'-PACK, a bag of wool weighing 240 lbs. WOOL'SACK, a sack of wool, in the *house of lords*, the seat of the lord chancellor, composed of a large square bag of wool covered with red cloth—introduced during Elizabeth's reign as a memento of an act which had been passed prohibiting the export of wool, then the main source of the natural wealth of England. WOOL'-SORTER, one who sorts wool; specifically, one whose business it is to assort different kinds of wool according to their fineness, length of fibre, etc. WOOL'-SORTER'S DISEASE, a virulent acute malady occurring among wool-sorters and other workers in the wool or hair of animals which had been affected with splenic fever; a form of Anthrax (q.v.). WOOL'-STAPLE, a city or town to which wool was brought for sale at the king's staple (see STAPLE): the fibre of wool. WOOL'-STAPLER, a dealer in wool; one who sorts wools for the different kinds of manufacture. WOOL'WARD, ad. in *OE.*, clothed in wool or with wool next the skin, as to go *woolward*, to wear uncomfortable clothing next the skin, hence to do penance. WOOLEN-DRAPER, a dealer in woolen cloth. WOOLENS, n. plu. fabrics made of wool or of a mixture of wool and cotton.

WOOL: fine, soft, curly variety of Hair (q.v.). The term hair is applied, in ordinary language, to a smooth, straight-surfaced filament like human or horse hair, without serrations of any kind on its surface. Wool, on the other hand, is always more or less waved, as in fig. 1; besides which, externally each woolly filament is seen under the microscope to be covered with scales overlying each other, and projecting wherever a bend occurs in the fibre: see fig. 2, in which one of the leading varieties of wool is shown both in its natural state (*a* in outline, and *b* complete) and after it has undergone the process of carding (*c* in outline, and *d* complete), in each condition both as a transparent and as an opaque object. On these minute points of difference the value of wool chiefly depends, es-

pecially with regard to the great variety of its applications. If each fibre were straight and smooth, as in the case of hair, it would not retain the twisted state given to it by spinning, but would rapidly untwist when relieved from the force used in spinning; but the wavy condition causes the fibres to become entangled with each other, and the little projecting points of the scales hook into each other, and hold the fibres in close contact. Moreover, the deeper these scales fit into one another, the closer becomes the structure of the thread, consequently of the cloth made of it. This gives to wool the quality of *Felting* (q.v.). By combing, or drawing the wool through combs with angular metal teeth, some of the scales are removed, and the points of many more are broken off, so that wool which has been combed has less of the felting property, and is consequently better

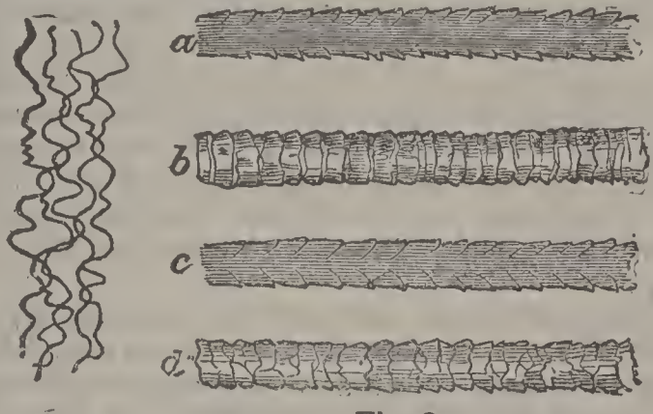


Fig. 1. Fig. 2.

adapted for light fabrics; and yarn made of such wool is called *worsted*, and the cloths made of it *worsted goods*. But such is the variety of wools obtained by careful breeding and selection, that these differences can be got without combing, some wools being found to have naturally fewer serratures, and a less wavy structure, than others: these are consequently kept separate, and are called *combing-wools;* while those much waved, and with many serratures, are called *carding-wools*, from their being simply prepared for spinning by carding-machines. The serratures or points of the scales are exceedingly small, and require the aid of a good microscope to see them. They vary from 1,200 to 3,000 to an inch.

Wool is the most important of all animal substances used in manufactures, and ranks next to cotton as a raw material for textile fabrics. Its use as a substance for clothing is almost universal in the temperate regions of the globe.

Previous to 1791, British woolen cloths were made almost wholly of British wools: at that time the whole supply of that country could not have much exceeded 100,000,000 lbs. The merino wool of Spain then began to displace them in the best kind of goods, and the imports from that country reached their maximum 1895 (7,000,000 lbs.). Before 1820, German wool had begun to supersede the Spanish, and was imported largely till 1841. After that, the cheaper wool of the Brit. colonies to a great ex-

tent took the place of the German, and the German is now chiefly used for only the finest cloths.

W. varies in character according to the peculiar breed of sheep which yields it, also with the nature of the soil, food, shelter, and climate. In a wool of first-rate quality the fibres are fine, soft, elastic, sound, of good color, and free from deleterious or troublesome impurities: the commercial value of any sample depends, therefore, on the extent to which it possesses these properties. If it be a combing-wool, the value will depend also on its length of staple.

For technical purposes, shorn fleeces are divided into two classes—one called *hogs* or *tegs*, the other *wethers* or *ewes*. The former are the first fleeces shorn from the sheep, the latter are those of the second and succeeding years; but the meaning of these terms varies a little in different districts. The fleeces of yearlings are, as a rule, longer in the staple, and otherwise of superior quality to the wool of older animals. In countries where it is customary to clip lambs, the wool so obtained is called *shorn lamb's-wool*. Wool taken from the skins of slaughtered sheep is called *skin-wool* or *pelt-wool*, and is of more variable quality than fleece-wool, on account of its being obtained in all stages of growth.

As long-stapled wools are used for worsted goods, and short-stapled for woolen goods, the various breeds which yield these two leading kinds are naturally divided into the long-wooled and short-wooled classes of sheep. The Lincoln, the Leicester, and the Cotswold breeds are considered good types of the former; and the Down, the Welsh, and the Shetland breeds, of the latter. The following is a brief notice of the characteristic properties of the various British wools:

Of the 'long wools,' the *Lincoln* has greatly risen in value of late years: it is coarse, of great length, and silky in appearance, so that it is adapted for 'lustre' goods, in imitation of alpaca fabrics. *Leicester* wool is esteemed for combing: it is rather finer in the hair, but not usually so soft and silky in the staple as the Lincoln. *Cotswold* wool is similar to the Leicester, but somewhat harsher: it is not suited for lustre goods. *Highland* wool is long-stapled and of coarse quality, but known to be susceptible of great improvements. The practice of 'smearing' greatly depreciates its value. It is used chiefly for the coarsest kinds of woolen fabrics, as carpets, rugs, and similar articles, also for Scotch blankets.

Of the 'short wools,' the different breeds of Downs partake very much of the same characters, though soil and climate affect them. The *South Down* is a short-stapled, small-haired wool, whose longer qualities are put aside for combing, and the shorter for manufacture of light woolen goods, such as flannel. The *Hampshire Down* differs from it in being coarser and in having the staple usually longer. The *Oxford Down* exceeds the Hampshire in length and coarseness of staple. The *Norfolk Down*, on the other hand, when clean, is very fine and valuable. The *Shrop-*

shire Down is increasing in importance, and is longer in the staple and has more lustre than any of the other Down breeds. *Ryelands* wool is fine and short; but the breed of sheep is nearly extinct. The *Welsh* and *Shetland* wools have hair-like texture, deficient in the spiral form on which depends the relative value of high-class wools. They are suited only for goods in which the properties of shrinking and felting are not required. Shetland wool is obtained of various natural tints, which enables it to be used for producing different patterns without dyeing.

Of the intermediate wools, *Dorset* is clean, soft, and rather longer, and not quite so fine in the staple as the Down breeds. The *Cheviot* has grown of late years in public estimation: it is small, fine-haired, of medium length, and suitable for woolen and worsted purposes, for which it is largely used.

Some of the British colonies are very important wool-producing countries, Australia in this respect standing far in advance of all other countries. Australian wool has in general a beautiful, short, silky staple, adapted for manufacture of soft, pliable, and elastic fabrics. All the settled districts of that continent are suitable for growth of fine-wooled sheep, and the increase in the flocks has been remarkable. The breed has sprung from three merino rams and five ewes taken out by Capt. M'Arthur 1797. The alpaca wool grown in Australia has been inferior; but this is attributed to rearing the animals too near the coast.

The wool of Cape Colony has been greatly improved by introduction of merinos, and exports are increasing rapidly.

Among imports from India, wool has become important, the quantity having risen from about 2,500,000 lbs. (1840) to 29,190,049 lbs. (1880); but the supply is rather fluctuating. A great deal of the Indian wool is coarse and hairy, and can be used for only low-class goods. The most costly of all wools is from the Tibetan goat, and is found next the skin, under the thick hair of the animal: from it the far-famed Cashmere shawls are made. The highest price of any quality which is sold is 6*s.* to 7*s.* ($1.25 to $1.75) per lb. in the native markets; but the maharajah of Cashmere keeps a strict monopoly over the best kind.

Turning to European countries, we note that Spain, native country of the merino, which formerly sent all the wool for the best English cloths, has allowed its quality to degenerate, and its quantity to dwindle away. The wool of Saxony, Silesia, and parts of Austria, which is obtained from sheep of the merino breed, is the finest produced in any country; and notwithstanding the lower price and nearly equal quality of the Australian, German wool is still employed for the finest broadcloths, some kinds of ladies' shawls, and a few other purposes. Great attention is given to breeding and rearing sheep in Germany, and large flocks are reared for their wool alone. In Austria the number of sheep is estimated at 45,000,000, and the annual yield of wool at 100,000,000 lbs., most of it being of fine quality, and all of which is consumed in Austrian

manufactures. France produces a large quantity both of fine and coarse wool. In Italy the production of wool from mixed merino breeds has become a source of great wealth. Russia, as might be expected from its great extent, rears many qualities, from the finest merino to a very coarse kind. The wools of the remaining countries of Europe are of minor importance. The world produced in 1908 about 2,650,000,000 lbs. of wool, of which the United States raised nearly 300,000,000 lbs., 126,000,000 lbs. were imported and about 5,600,000 lbs. exported. At the same date there were in the United States about 61,000,000 sheep and lambs, valued at $171,000,000. The chief wool producing centres are, in the order of their output in 1908: Australia, 480 millions; Argentina, 370 millions; Russia, including Poland, 360 millions; United States, 300 millions; Great Britain and Ireland, 133 millions; Spain, 102 millions; and South Africa, 100 millions. Other countries that produce a large amount of wool are Uruguay, 96 millions; France, 91 millions; British India, 85 millions; Turkey and the Balkan States, about 68 millions; Austria-Hungary, about 65 millions; Russia, 60 millions; Germany, 50 millions; central Asia, 46 millions; China, 35 millions; and Asiatic-Turkey, 33 millions.

WOOLD, v. *wôld* [Dut. *woelen*, to move to and fro, to wind:] among seamen, to wind a rope round a mast or spar on a place where it has been fished or scarfed; to wrap a yard round in order to prevent it chafing. WOOLD'ING, imp.: N. the act of winding, as a rope round a mast; the ropes used for binding a mast or spar. WOOLD'ED, pp.

WOOL'EN AND WORSTED MANUFACTURES: fabrics of wool and of worsted, and the processes by which they are made. The spinning and weaving of wool was practiced from an early period in Asia Minor, Greece, Italy, and some other countries. It is very probable that the first lessons which our ancestors received in this art were from the Romans after their conquest; but the origin of the manufacture as a great staple is generally supposed to date from the time of William the Conqueror, when some Flemish weavers came to England, and obtained the patronage of the queen. The trade fell off during the troubles of succeeding reigns. In 1331 it revived by another supply of Dutch weavers brought over by Edward III. In 1530 the introduction of the spinning-wheel gave new impetus to the trade. French workmen, driven to England by the revocation of the Edict of Nantes 1685, brought skill in making fine cloth, and from that time to the present it has steadily prospered—having shared, with other leading textile manufactures, the great advancement by the spinning-jenny, the mule, and the power-loom.

There are two great classes of manufactures using wool as a raw material: in one, carded wool is employed, and

the goods are called 'woolen fabrics;' in the other, combed wool is used, and the goods are called 'worsted fabrics.' See WOOL.

Woolen Manufacture.—As the articles on SPINNING and WEAVING (see those titles) are general, we here briefly state the chief stages in these processes of this manufacture A fleece of wool is first sorted by experienced sorters into several qualities, as first sort, or 'pick-locks;' second sort or quality; third sort or quality; and so on. Sometimes it is divided into only three, sometimes into as many as six kinds. The 'scouring' is the next step, and consists in immersing the wool in an alkaline lye, which forms a soap with the natural grease of the fleece. This of course acts as a detergent, and cleans the wool thoroughly when it is washed in water. On the perfection of the scouring depends in great part the beauty of the dye. It is often dyed at this stage, and is then said to be *wool-dyed;* if not dyed till it is woven, the cloth is said to be *piece-dyed.* For some purposes it is dyed in the yarn.

Scoured wool, dyed or not, next undergoes 'willying.' The 'willy' is a machine to cleanse the wool from dust and other loose impurities. In many cases, seeds with hooked scales like burs are so thickly entangled in the wool that it requires to be passed through a 'burring'-machine, and afterward examined by 'pickers:' this is especially the case with S. Amer. wool, including that of the alpaca. After this the wool is sprinkled with olive-oil, which renders the fibres soft, flexible, and better fitted for later operations. The next process consists in tearing open the matted portions, and separating the wool into small tufts by means of a machine called a *teaser, tucker,* or *devil:* this has a large cylinder studded with iron pikes, which performs from 1,000 to 2,000 revolutions per minute, teasing the wool as it revolves, and throwing it out like flakes of snow.

The two next operations are *scribbling* and *carding,* performed by two somewhat similar machines, for whose essential parts, see SPINNING. Each machine consists of a large cylinder surrounded by several small rollers, all covered with wire cards or brushes. These, acting like fine toothed combs, open out, mix, and blend the fibres into a uniform and continuous sheet or lap, in which state it leaves the *scribbler;* but in the *carder* the sheet is at length converted into small rolls, say from a quarter to half an inch in diameter, which are afterward joined together, and form the basis of the thread. In the next machine, called the *slubbing-billy,* these rolls are drawn out, slightly twisted, and, in short, half converted into yarn. The spindles upon which these *slubbs* or *slubbings* are wound pass them to the *spinning-mule,* where they are converted into finished yarn.

Improvements have made the operations of scribbling, carding, and slubbing continuous, mainly through the introduction of Apperly's patent feeder, and of a modification of the carding-machine called a *condenser,* which does away with the use of the slubbing-billy; so that what

with the older machines is three separate processes, with the newer may be regarded as only one. Each of the foregoing operations occasions a certain amount of 'waste' wool, which is worked up again into inferior goods. It was to such waste that the name *shoddy* was originally applied. In the spinning process, the warp yarns, having to bear the strain of the loom, are made in a different way from those for the weft, and are hardened with size.

The difference between woolen and worsted fabrics is due in great part to the mode of spinning the yarn for each. Yarn for woolen cloth is very slightly twisted, to leave the fibres as free as possible for the felting process; worsted yarn, on the contrary, is hard-spun, and made into a much stronger thread. On account of the feebleness of woolen yarn, it is more difficult to weave it by power looms than either worsted, cotton, linen, or silk.

Woolen cloth is now woven chiefly by power-looms: see LOOM: WEAVING. When the cloth is taken from the loom, it has a bare look, and is called the *raw thread*. It must first be *brayed* or *scoured*, to remove the oil added to the wool before spinning, and the size added to the warp: this is done by immersing it in some ammoniacal detergent liquid, such as urine and hog's dung, and squeezing it between rollers, or beating it in the fulling-stocks, and then rinsing it in clean water. The cloth then passes to the *burler*, who removes any knots or burls, and helps any imperfections. The next process to which it is subjected is the *milling* or *fulling*, and is very important. In some mills this is still done by beating the cloth in the *fulling-stocks*, which are heavy wooden mallets, raised by wheels with projecting cams; but a newer *fulling-machine* has come into use, in which the cloth is felted by passing it in a confined space between heavy rollers. With either machine, a thick solution of soap is used, and in the fulling-stocks an ordinary broadcloth will take 60 hours to mill, but considerably shorter time suffices in the fulling-machine. The result of the operation is, that the fibres of wool become so interlocked—so thoroughly felted—as to leave no appearance of thread. The shrinkage of the cloth in the milling is sometimes nearly a half in the width and about a fourth in the length. Another scouring follows the milling, and after that the nap or pile of the cloth is *raised* by Teasels (q.v.). These curious thistle-like heads are set in frames, which are arranged upon a large cylinder—the whole apparatus being called a *gig-mill*. As the cylinder revolves, the spines of the teasels raise the nap, which is afterward cut by a process termed *shearing*. For this purpose, a cutting-machine with spiral blades arranged round an iron cylinder is used; and when it revolves, the spiral cutters, acting against a straight steel blade, shear off the nap of the fabric like scissors. The cloth is then boiled, or 'scalded,' to impart a lustre to it, and to prevent spotting with rain. After this it is dyed (if this is not previously done in the wool), and finally it is pressed between polished iron plates in a powerful hydraulic press. With respect to the dyeing of black

cloth, it may be as well to explain that the term *woaded colors*, so commonly used in the trade, originally meant that Woad (q.v.) was used in conjunction with indigo as the basis of the color—a combination which produces the best and most durable color. Of late years, however, the name has been applied to the color of the fabric when indigo itself has been used as its basis. It is only the finest cloths that are now dyed in either of these ways—logwood, a salt of iron, and galls being usually employed to produce a black.

Names are given to various kinds of woolen cloths according to the style in which they are finished, the special material of which they are made, and the purpose for which they are intended. *Broadcloths* are classed into 'superfines,' 54 to 62 inches wide; 'mediums,' 54 to 58 inches; 'double-milled,' 54 to 56 inches; and Venetians, which are twilled fabrics, 54 to 58 inches. The general term broadcloth also includes the following varieties, which mostly have less highly finished surfaces—meltons, beavers, pilots, cloakings, china striped cloths, India cloths, elastics, lustres, and union cloths which have cotton warps and woolen wefts. *Narrow cloths*, which average about 27 inches wide, include cassimere, a thin, fine, twilled fabric; doeskin, also twilled, a strong, smooth-finished, sometimes treble-milled cloth, now usually dyed black for trouserings; Tweeds (q.v.), which have very much taken the place of fancy doeskins; and several other varieties. Then there are special kinds both broad and narrow—e.g., army cloths, rifle cloths, police cloth, upholstery cloth, carriage cloth, coffin cloths, and many more. Flannels, blankets, and some shawls also are included among woolen goods.

The public taste has changed much of late years as to the finish of woolen cloths. Formerly a firm, close, and hard fabric, with highly dressed or glossy surface, was in demand; now a softer and more pliable finish, without gloss, is in favor. Some manufacturers think, however, that a soft, rich, elastic cloth is apt to lose in strength what it gains in appearance, and do not finish so highly as the English. The desire for fancy woolens is another marked feature of the taste of the present day, and compels manufacturers to expend considerable sums in preparation of designs and colors. It has also caused enlargement and development of the art schools in connection with the manufacture.

Of all the changes during the present generation in this trade, the most remarkable is the production of cheap cloths by the use of shoddy; though cotton warps also have done much in the same direction. Prepared shoddy is obtained mostly by tearing up woolen rags by a *swift*, with 10 or 12 thousand iron spikes on it, revolving inside an iron cylinder. Shoddy now enters to a greater or less extent into the composition of all but the very finest woolen cloths. It began to be used in the first part of the 19th c., but the prejudice against it is scarcely yet overcome. Nevertheless it has become so necessary, that to stop the supply might be to shut one third of the woolen-mills.

The excellent finish now given to woolen cloths containing a large proportion of shoddy, and also cloths with cotton warps, is surprising; moreover, their cheapness has brought comfortable clothing within the reach of the humblest classes. Cloths with too much shoddy in them are easily torn; but if a judicious admixture of pure wool has been employed, they wear comparatively well. Formerly the only use of woolen rags was to make flocks for wall-papers, for saddlers' stuffing, and some minor purposes—the greater part being used as manure.

In the British Islands the various branches of the woolen manufacture are extensively diffused. The principal seat of the manufacture of superfine broadcloth is w. England—Gloucestershire and Wiltshire especially—where it has existed for centuries. But Yorkshire is the great seat of the woolen manufacture, including all the kinds, Leeds and Huddersfield being the great centres: one-half of all the operatives in the woolen factories of the kingdom are employed in Yorkshire.

According to the census of 1900 there were 305 establishments engaged in the manufacture of woolen and worsted goods in 209 cities, the woolen mills numbering 202, and the worsted mills 103. The combined capital was $139,603,053; employes 66,799; amount of annual wages $23,482,995; cost of materials used $81,835,660; and value of output $130,900,373.

Worsted Manufacture.—Worsted yarn, as above noted, is spun in a different way from woolen yarn. In the worsted the fibres are arranged as parallel as possible; in the woolen they are crossed in every direction, to assist the felting or milling of the cloth. For worsted the wool is first combed, formerly by hand-combs. The introduction of machines for combing wool has formed an epoch in the worsted trade. They are of two kinds—for combing long and for combing short wool. Heilmann's machine, made in 1846, was the first which did its work successfully. Lister's machine, now much used for combing long-stapled wool, is an improvement.

The remaining processes in worsted spinning closely resemble those for cotton: see SPINNING. The products of these are: 1. Fleece (Lincoln wool). 2. Combed 'top.' 3. Noils, or short wool. 4. Sliver from first drawing-frame. 5, 6, 7, 8, 9, and 10. Slubbings from second, third, fourth, fifth, and seventh drawing-frames. 11. Roving from roving-frame. 12. Spun yarn.

Figured worsted yarns are woven by various kinds of looms (see JACQUARD LOOM); plain kinds are woven in looms like those for woolens. Unlike woolens, when worsted goods leave the loom, they require only a superficial dressing.

Worsted stuffs are usually classified according to the materials of which they are composed—viz.: 1. Fabrics entirely of wool. 2. Fabrics of wool and cotton. 3. Fabrics of wool and silk. 4. Fabrics of wool, silk, and co.

ton. 5. Fabrics of alpaca and mohair mixed with cotton or silk.—The *first* of these classes includes the fabrics well known under the name 'merinos,' and so called because they were made first of Spanish wool: for the 'double-twilled' kinds, the French still maintain superiority; but for the 'single-twilled,' the Yorkshire makers are considered the best. This class comprises also shalloons, says, serges, lastings—all stout and heavy fabrics—besides durants, buntings, moreens, damasks, reps, Russells, camlets, and many others, both for dress and furniture. Mousseline-de-laine was, as its name implies, originally all wool, but it is now usually mixed with cotton, and printed.

The *second* class includes two fabrics of which the consumption for women's dresses has been immense—viz., Coburg and Orleans cloths, the former twilled, the latter plain. Many of the names used in the all-wool class are retained in this, with addition of the word 'union,' e.g., union merino, union shalloon, union damask, etc. Winceys, favored for ladies' winter dresses on account of their warmth, are of wool and cotton, from yarns heavier and coarser than those used for cloths like Coburgs. Winceys are largely made at Aberdeen, Perth, Glasgow, and other places in Scotland, as well as in Yorkshire.

The *third* class includes the rich Poplins (q.v.) and Tablinets (q.v.), made chiefly in Dublin, and giving employment there to about 1,200 hands. Paramatta or Henrietta cloth, Canton cloth, and others, are made both of silk and wool, and cotton and wool. Some Coburgs, Orleans, Russells, and Damasks are likewise made with silk warps.

The *fourth* class—viz., mixed goods, in which silk, wool, cotton, and sometimes linen are used—includes peculiar kinds of some of the fabrics named above, also vestings, linings, cravats, shawls, scarfs, quiltings, boot and shoe cloths, barèges, etc.

The *fifth* class includes alpaca lustres and mixtures—plain, twilled, and figured; alpaca-poplins; umbrella and parasol cloth; mohair lustres, glacés, Verona serges, barèges, etc.

The term 'worsted' is said to have derived its origin from a village of that name in Norfolk, England, where first this manufacture was carired on. Till the end of the 18th c., worsted goods were a staple trade of Norwich; but the neglect of the factory system there led to its transfer to Bradford, now the metropolis of the manufacture.

WOOLF, Albert Edward: American chemist and inventor, son of Edward Woolf: b. New York 1846. He was educated in the College of the City of New York. Among his discoveries are the antiseptic and medical properties of sea-water combined with the electric current; the use of peroxide of hydrogen to bleach black

ostrich feathers white, and also its employment as an antiseptic.

WOOLF, Benjamin Edward: son of Edward Woolf, American dramatist and musician; b. London, 1836, Feb. 16; d. Boston, Mass., 1901, Feb. 7. Coming to New York in childhood with his parents, he early displayed a passion for music and was carefully trained by his father, with such results that in later days he became the leader of orchestras in Boston, Philadelphia, and New Orleans. He settled in Boston, where he was dramatic critic for the *Saturday Evening Gazette* 1871-93, a post which he quitted for a similar one on the Boston *Herald.* He was an industrious musical composer, writing many overtures, quintets, and trios, besides plays and operettas. His most successful comedy was *The Mighty Dollar,* while his operetta *The Doctor of Alcantara,* was a favorite in its time.

WOOLF, Edward: American musician: b. London, England, 1803, Sept.; d. New York 1882, Mar. 14. In 1839 he came to New York, where his musical genius was soon recognized not only as teacher and composer, but also as orchestral leader. His excessive shyness and modesty kept him in the background and prevented his securing the position intellectually his due. He was the author of many novels that appeared in the early years of *The Jewish Messenger,* such as *The Jewess of Toledo; The Vicomte D'Arblay;* and *Judith of Bohemia.*

WOOLF, Michael Angelo: American artist, son of Edward Woolf: b. London, England, 1837; d. New York 1899, Mar. 4. Brought to New York in his babyhood, he early evinced a love for art and studied wood engraving for seven years. In the early sixties he was an illustrator for *Yankee Notions,* then a popular journal, and was on the stage for a time, returning finally to art, and going to Munich and Paris to study painting. On resuming his work in New York, his first drawing of a ragged newsboy for a paper called *The Pick* elicited such comment that he began the series of street caricatures on which rests his fame. These reveal his humanity as well as artistic insight.

WOOLF, Philip: American physician and novelist, son of Edward Woolf: b. New York, 1848, Feb. 7; d. 1903. He was graduated from the Medical College of Bellevue Hospital in 1868, and was for some time editor of the Boston *Saturday Evening Gazette.* His novels include *Who Is Guilty? The Trail of the Serpent, Satan's Mirror, Three Women and a Dead Man; Goldenrod and Aster.*

WOOLLETT, *wûl'et,* William: eminent English engraver: 1735, Aug. 15—1785, May 23; b. Maidstone. He went early to London; studied his art; and, developing a manner of his own, soon became known as one of the most accomplished engravers of his time. His first

important plate was published 1761. In recognition of his merit, he was appointed engraver to George III. (1775). Though his works are familiar, almost nothing is known of his life. He died in London, and a monument was erected to him in Westminster Abbey. His works, especially in landscape, are much prized by connoisseurs. His foregrounds are vigorous and solid, and his aerial perspective wonderfully clear and true, while he treats water, the crux of the engraver, with supreme success. His masterpieces are his *Niobe* and other plates after pictures by Richard Wilson, and the *Death of Wolfe* and the *Battle of La Hogue* after West. He was the first who conceived and embodied in practice the idea of uniting in one plate the three methods of engraving, by aqua fortis, the burin, and the dry needle. His genuine plates are estimated at 123, but impressions are exceedingly rare and valuable, as he permitted no imperfect prints to be struck off.

WOOLLEY, Celia Parker: American Unitarian minister: b. Toledo, Ohio, 1848, June 14. Graduated from Coldwater Female Seminary, in 1868 she was married to J. H. Woolley, and in 1876 removed to Chicago. She was pastor of the Unitarian Church, Geneva, Ill., for three years, and of the Independent Liberal Church, Chicago (1896-8), since when she has been active as a lecturer and in the work of women's clubs. She is the author of the novels *Love and Theology* (1887), republished as *Rachel Armstrong, or, Love and Theology; A Girl Graduate* (1889); *Roger Hunt* (1893); *The Western Slope* (1903).

WOOLLEY, John Granville, A.M.: American prohibitionist: b. Collinsville, Ohio, 1850, Feb. 15. Graduated from the Ohio Wesleyan Seminary in 1871, he was admitted to the bar of the Illinois supreme court in 1873, became city attorney of Paris, Ill., in 1875, and prosecuting attorney in Minneapolis in 1881. At one period addicted to intemperance, he began lecturing against it in 1888, and has lectured to many audiences on this theme at home and abroad. He has been editor of *The New Voice*, a prohibition organ, since 1899, and was the presidential candidate for the Prohibition party in 1900, receiving a vote of 208,914. He has published: *Seed; The Sower; Civilization by Faith; The Christian Citizen; The Lion Hunter.*

WOOLMAN, *wûl'man*, John: Quaker preacher: 1720, Aug.—1772, Oct. 1; b. Northampton, N. J. He was brought up on a farm, became clerk at Mount Holly, and taught a school for poor children, learned the trade of tailor, and undertook an itinerant life as a speaker in meetings of Friends throughout the American colonies. He set out 1746 for a tour through the back region of Virginia, and devoted the rest of his life to such journeys. He was conspicuous as a pioneer in anti-slavery

work, both in his preaching, and by such publications as his *Considerations on the Keeping of Negroes* (1753, 2d part 1762). His *Journal* has become well known through its republication with an introduction by John G. Whittier (1871). An ed. of his collected works appeared 1774-5. He died while on a visit to York, England.

WOOL'NER, Thomas: English sculptor and poet: b. Hadleigh, Suffolk, 1825, Dec. 17; d. London, 1892, Oct. 7. At 12 he was placed in the studio of William Behnes, in 1842 entered the schools of the Royal Academy, and in the following year his first work, *Eleanor Sucking the Poison From the Arm of Prince Edward*, was exhibited. His first work to attract attention was *The Death of Boadicea* (1844), and this success was followed by *Alastor* (1846); *Puck* (1847); *Titania and Her Indian Boy* (1848); and *Eros and Euphrosyne* (1848). About 1850 he was associated with Rossetti and the other artists who formed the Pre-Raphaelite Brotherhood, in founding the short-lived but famous periodical called *The Germ*. His contributions, which were in verse, were collected and published, with additions, under the name *My Beautiful Lady* (1863). Woolner visited Australia in 1852, and one of his first works on his return was a life-size statue of Lord Bacon for the Oxford Museum. Among his more important works are: *Elaine With the Shield of Sir Lancelot; In Memoriam* (1870); *Guinevere* (1872); *Lady Godiva* (1876); portrait busts of Carlyle, Tennyson, Darwin, Newman, Gladstone, Kingsley, and Dickens, and statues of Lord Macaulay for Trinity College, Cambridge (1866), Sir Bartle Frere for Bombay (1872), Dr. Whewell for Trinity College, Cambridge (1873), Lord Lawrence for Calcutta (1875), J. S. Mill for the Thames Embankment (1878), Captain Cook for Sydney (1879), Sir Stamford Raffles for Singapore (1887), and Lord Palmerston for Palace Yard, Westminster. He became a Royal Academician in 1874, and for a time was professor of sculpture in the Academy. His fame as a sculptor has overshadowed his reputation as a poet, but *Pygmalion* (1881), *Silenus* (1884), *Tiresias* (1886), and *Poems* (1887) give him honorable rank among the minor poets of his time.

WOOLSEY, *wûl'sĭ*, Melancton Brooks: naval officer: 1817, Aug. 11—1874, Oct. 2; b. in New York; son of Com. Melancton Taylor Woolsey. He was midshipman 1832; master 1847; lieut. 1847; on the reserved list 1855; and on the receiving ship, New York, 1861. Commander of a blockading steamer, he fought at Fort Pemberton, S. C., 1862, repulsed the Confederates at Secessionville, and had part in the attack on James Island. Promoted commander that year, he was in the Gulf squadron, and helped the defeat of the Confederates at Donaldsonville, La., receiving much credit for his part. Until the close of the war he was in the blockading service. He was promoted capt. 1866, commodore 1871;

was commandant of the Pensacola navy-yard 1873, and, heroically choosing to remain there during the prevalence of yellow-fever 1874, died of that disease.

WOOL'SEY, Melancton Taylor: naval officer, hero of the lakes in the war of 1812: 1782-1838, May 18; b. New York. He studied law, but became a midshipman 1800; saw the close of the war with Tripoli; was promoted lieut. 1807, and the next year had charge at Oswego of the first building of U. S. vessels of war on the lakes. He commanded the first vessel completed, the *Oneida;* also the naval station at Sackett's Harbor 1812. In July of that year he repulsed a squadron of 5 vessels, having put half his battery on shore. In 1813 he was in the attack on Kingston; was made master-commandant; participated in the capture of York (now Toronto), and of Fort St. George, at the head of the lake; also in the pursuit of the British squadron; and took a number of vessels from the enemy. The next year he got off safely with guns and stores from Oswego, and captured the pursuing British at Sandy Creek, together with their boats and guns. He was made capt. 1816; stationed at Sackett's Harbor until 1824; was in command of the frigate *Constellation* in the West Indies 1824-27, of the Pensacola navy-yard 1827-31, of the Brazil station 1832-34, and of the Chesapeake surveys 1836-7. He died in Utica, N. Y.

WOOL'SEY, Sarah Chauncey (pen-name Susan Coolidge): author of juvenile and other books: b. Cleveland, O., 1845; d. 1905; niece of Pres. Theodore Dwight Woolsey. Among her many publications are: *The New Year's Bargain* (1871); *What Katy Did* (1872); *For Summer Afternoons* (1876); *Eyebright, a Story* (1879); *The Guernsey Lily, or How the Feud Was Healed* (1881); *A Little Country Girl* (1885); *A Short History of Philadelphia* (1887); *Clover* (1888); and, with others, *Ballads of Romance and History* (1887). She translated from Gautier *My Household of Pets* (1882); edited *Autobiography of Mrs. Delaney* (1879), and *Diary and Letters of Frances Burney* (1880); and the same year published a volume of *Verses.*

WOOLSEY, *wûl'sĭ,* Theodore Dwight, d.d., ll.d.: pres. of Yale College: 1801, Oct. 31—1889, July 1; b. in New York; nephew of the first President Timothy Dwight. He graduated at Yale 1820; studied law one year, and theol. at Princeton Seminary two years; was tutor at Yale 1823-25; was a student of Greek in Europe 1827-30; prof. of Greek at Yale 1831-46, and pres. of that institution 1846-71, after which he gave some instruction in the Law School, while applying himself chiefly to political and social science. He was one of the regents of the Smithsonian Institution, chairman for ten years of the American Bible-revision committee, and held other honorable offices. As occasional preacher he

was in high esteem, both as a fervid speaker and a learned and large-minded expounder of the Bible and of theology. In the class-room he was candid while enthusiastic, as a lover of truth should be; and was conspicuous for thorough scholarship and wide knowledge. By his personal qualities of modesty, sincerity, simplicity, and unselfishness, he commanded universal respect and admiration. He was regarded as an authority on international law—a distinction inherited by his son, Theodore Salisbury Woolsey, prof. of that dept. in the Yale Law School.—Besides editing the *New Englander* for some years, and contributing to other reviews, Pres. Woolsey published editions in Greek, with notes, of select works of Euripides, Sophocles, Æschylus, and Plato; *Introduction to the Study of International Law* (1860, enlarged 1879); *Essays on Divorce and Divorce Legislation* (1869); *Religion of the Present and of the Future,* sermons (1871); *Political Science, or the State, Theoretically and Practically Considered* (2 vols. 1877); *Communism and Socialism in their History and Theory* (1880); *Eros, and Other Poems* (privately printed 1880); *Helpful Thoughts for Young Men* (1882); and he edited, with notes, Lieber's *Civil Liberty and Self-Government,* and *Manual of Political Ethics.* He also published occasional discourses, including an inaugural on *College Education,* and contributed to *The First Century of the Republic* (1876). To Yale University he gave his library of Greek literature. He died in New Haven.

WOOLSTON, *wûl'ston,* THOMAS: heterodox clergyman of the English Church: 1669-1731, Jan. 21; b. Northampton. He was educated at Sidney Sussex College, Cambridge; was elected a fellow of his college; and took holy orders. His naturally lively fancy, developed by study of the works of Origen led him to an extreme—and, some have thought, insane—allegorical interpretation of the Scriptures. In his first published work, 1705, Woolston maintained that Moses was only an allegorical person, and all his history typical of that of Christ; that the miracles of the Pentateuch were allegorical, as also all the miracles attributed to Christ and the apostles; and he stigmatized as atheists and apostates all who received the Scripture narratives as literally, historically true. In later publications he praised Quakerism, denouncing clergymen as 'hireling priests' and ministers of Antichrist: some of his works on the gospel miracles occasioned much scandal as indecent and blasphemous so that he narrowly escaped prosecution. Until 1720, Woolston had continued to live in his college, a studious man and showing kindness to the poor. In 1720 he went to live in London; and 1721 his college deprived him of his fellowship. Representing himself as the defender of true Christian doctrine, yet maintaining that the gospel narratives, taken literally, were only a tissue of absurdities, he was triumphantly quoted by the free-think-

ers in England and on the continent as a champion of their cause. To rid the Christian faith of so dangerous a defender, W. was prosecuted (about 1730) for writings alleged to be blasphemous; was found guilty, and sentenced to be imprisoned for a year, fined £100, and ordered to give securities in £2,000 that he would not repeat his offense. Being unable to pay the fine, and both unable and unwilling to provide the securities, he died in prison after about a year's confinement.

WOOLWICH, *wûl'ĭj:* parish of Kent, England; seat of the chief govt. arsenal, on the s. bank of the Thames: 10 m. by rail (12 m. by steamboat) from Charing Cross, London. It extends 2 m. along the river. Its s. suburbs are handsome and regular. There are numerous places of worship—Anglican, Rom. Cath., and dissenting—and there are numerous schools, a theatre, etc. Its dock-yard, its govt. establishments for manufacturing all war materials (except gunpowder), and the fact that it is a great depot for naval and military stores, also the headquarters of the great corps of royal artillery, give W. great importance. A royal dock-yard existed here 1515. The *Royal George* (q.v.) was built here 1751. The Royal Arsenal, largest in Britain, contains immense stores of all kinds for armies, navies, and forts; and comprises establishments for manufacturing them, and for preparing ammunition. These works are in three departments—Gun Factories, Carriage Department, and Laboratory. On the common, s. of the town, is the Royal Milit. Acad., for education of cadets for the artillery and engineers. The Royal Ordnance College is also located at W. There are many factories in the vicinity of Woolwich notably that for constructing telegraph cables. See MILITARY ACADEMY, ROYAL: GUN FACTORIES, ROYAL.—Pop. (1881) 36,665; (1891) 40,848; (1901) 117,165.

WOONSOCKET, *wôn- sŏk'ĕt:* town in Providence co., R. I.; on both sides of the Blackstone river, and on the New York and New England and the New York Providence and Boston railroads; 16 m. n.-by-w. of Providence, 28 m. s.s.e. of Worcester, 38 m. s.w. of Boston. It derives exceptionally fine water-power from the river, and its importance as a manufacturing centre is greatly enhanced by the large number of industrial villages that surround it. In 1900 it had 242 manufacturing establishments, which used a capital of $14,450,820, employed 8,093 hands, paid annually $7,563,204 wages, the cost of material being $7,563,204; and total value of products $15,627,539. The principal industry was manufacture of cotton goods, for which there were 5 mills employing 2,496 hands, paying $820,786 wages, using cap. $4,278,613, turning out products val. at $2,389,586. For woolen goods, 3 mills, using cap. $1,004,695, employ. 233 hands, paying $96,848 wages, products val. $785,677. The products of W. include cotton goods, factory and machine shop products, worsted goods, hosiery and knit goods, carved and turned wood, wagons, carriages, woolen goods, machinery and furniture. There are several daily and a number of

weekly periodicals; street railways; gas and electric light plants; improved water-works; paid fire dept.; and electric fire-alarm. Among the buildings are the city hall; high school and grammar schools; Harris Institute, with free circulating library, lyceum, reading-room, and hall; hospital on the cottage system and with an attractive park; several public halls; and a model opera-house. W. contains churches of all leading denominations, several colleges for young men and young women, and a library of about 16,000 volumes. There are nine banks and trust companies. Pop. (1900) 28,204; (1910) 38,125.

WOORALI, *wô'ra-lĭ:* poisonous substance known also as *Curare* (q.v.), *Urari*, etc. The physiological action of this fearful poison has been carefully studied by Bernard, Waterton, Virchow, Steiner, Foster, and others; and its remarkable properties have become more fully understood: see Bernard's *Leçons sur les Effets des Substances Toxiques* (1857); Dr. Richard Schomburgk's pamphlet *On the Urari, the deadly Arrow Poison of the Macusis* (Adelaide 1880); and article by Yule, *Nature*, XII.—The best of the earlier investigations is that of Roulin and Boussingault 1828, who obtained from the crude 'woorala' an alcoholic extract, to which they gave the name *curarin:* this was a solid transparent mass, excessively bitter, and having all the virulence of the Woorali. Heintz examined the precipitate which tannic acid throws down from the watery solution of the

Woorali or Curari Plant (*Strychnos toxifera*).

poison, but only found that it contained no nitrogen and was composed of apparently inert substances, as sugar, gum, resin, extractive matter, tannic and gallic acids, etc.; he sought in vain for strychnine. Among chief experimenters were De la Condamine (*Mem de l'Académie des Seiences*, 1745, t. 62, p. 391); Brocklesby (*Philos. Trans.*, 1747, XLIV. 408); Herissant (*Philos Trans.*, 1751–2

XLVII. 75), who killed a bear with a poisoned arrow in less than five minutes; and nearly killed himself and a small boy who was evaporating an aqueous solution of the poison—both, however, recovered under the influence of fresh air, a pint of wine, and a quantity of sugar; Fontana (1781), who showed that (notwithstanding the above experiment) the vapor is not deleterious, and that the state of the stomach at the time when the poison was inhaled modified the result, an animal with a full stomach being able to resist the action of a dose fatal to one of the same size when fasting; Brodie (*Philos. Trans.*, 1811–2); Virchow and Münter (see Schomburgk's *Reisen in Britisch Guiana*, I.), who, *inter alia*, showed that the poison, even after being kept dry five years, is still intensely active—that its physiological action shows absence of strychnine, and that it belongs to narcotic rather than to tetanic poisons—and that death takes place not from direct result of the poison, but indirectly, through cessation of the respiratory process; and Kölliker (*Proceedings of the Royal Soc.*, 1857), who arrived at the following conclusions: (1) That the *urari* (as he terms it) causes death very rapidly when injected into the blood or inserted into a wound; and that when introduced by way of the mucous membrane, its effects are slow, and require a large dose; when applied to the skin of frogs, it is inoperative—(2) it acts through the blood, and destroys the excitability of the motor nerves, while the sensory nerves are scarcely affected—(3) when artificial respiration is carried on in animals under its influence, many of the secretions are increased, owing to paralysis of the vascular nerves and consequent dilatation of the vessels—(4) that in mammals the poison causes death by paralysis of the respiratory nerves and suppression of the respiration, which brings on convulsions as a collateral effect.

The researches (1863) of Weir, Mitchell, and Hammond, on the two hitherto undescribed varieties of the poison—named *Woorara, variety Corroval*, and *Woorara, variety Vao*—lead to the following results. The corroval, asserted to be the strongest arrow-poison, but of whose mode of manufacture they could learn nothing, was in large lumps of brownish-black color, resembling vegetable extracts of that tint. From its aqueous solution they obtained a substance possessing all the qualities of an alkaloid, and in an eminent degree the poisonous properties of the corroval; and to this they assign the name *Corrovalia*. Hence it differs materially in chemical composition from ordinary woorali. From a large number of experiments on living birds, mice, cats, frogs, and alligators, they find (1) that corroval differs essentially in its physiological results from any variety of woorali hitherto described; (2) that it acts primarily on the heart through the medium of the blood, arresting the heart's action; (3) that the annihilation of voluntary and reflex movements is a secondary result of its action, depending primarily on the cessation of the heart's action, (4) that it acts on the nerves from the surface to the centre and abolishes both the sensory and motor functions; (5)

that it destroys muscular irritability; (6) that it paralyzes the sympathetic nerve, this being one of its primary effects; (7) that it is absorbed from both the intestinal canal and the skin of frogs; (8) that its poisonous effects are due to an alkaloid hitherto undescribed. *Vao* is a weaker variety of corroval. The use of Woorali (called also *Woorara* and *Ticuna*) in practical medicine is very limited. It has come to be employed as an anæsthetic in physiological experiment. Its use has been suggested as an antidote to strychnia; but though it would prevent that spasm of the respiratory muscles which is usually the cause of death in strychnia poison, it would doubtless do so by producing equally fatal paralysis.

WOOSTER, *wôs'tėr:* city, cap. of Wayne co., O.; on Killbuck creek, and on the Pittsburg Fort Wayne and Chicago railroad; 25 m. w. of Massillon, 40 m. e. of Mansfield, 55 m. s.-by-w. of Cleveland. It is an important manufacturing centre in a fine agricultural region, and is the seat of Wooster Univ. (Presb.), chartered 1866. The city is also the seat of the Ohio Agricultural Experiment Station. Wooster contains 14 churches, high school, graded schools, two libraries, national and other banks, and daily and weekly periodicals; and manufactures machinery, furniture, brushes, agricultural implements, musical instruments, carriages and wagons, flour, woolen goods, engines, boilers, etc.—Pop. (1900) 6,063; (1910) 6,136.

WOOSTER, *wûs'tėr,* Charles Whiting: naval officer: 1785-1848; b. New Haven, Conn.; grandson of the patriot soldier Gen. David Wooster. He early acquired a fortune capturing prizes with the privateer *Saratoga* in the war of 1812. In 1817 he sold his armed brig *Columbus* to the Chilian government, and became a captain in its service. After a fortunate cruise on the coasts of Peru and Mexico, he joined an expedition to intercept a Spanish frigate and fleet of nine transports; was foremost in the success achieved, and was put in command of the captured frigate. Wooster declined 1819-22 to serve under Lord Cochrane, who had the chief command of the Chilian navy; but returned to his old command after Cochrane's departure, and became rear-admiral 1829. He went to California 1847, but was not successful in mining.

WOOS'TER, David: revolutionary soldier: 1710, Mar. 2—1777, May 2; b. Stratford, Conn. He graduated at Yale 1738; on the outbreak of war between England and Spain 1739 he became lieutenant in the provincial army, and later captain of a vessel fitted out by the colony for defense of its coasts. He served in Aaron Burr's regiment 1745, in the Louisburg expedition, and went thence to England in command of a cartel. Under Sir William Pepperell he was a captain on half-pay to 1774; was made colonel 1775, and later was promoted brigadier-general; served during the French war 1756-63; then orig-

nated the expedition that captured Ticonderoga 1775, Apr.; was a member of the Conn. assembly; and on the organization of the continental army was third of eight brig.gens. appointed. He served in Canada with Montgomery, was in command after the latter's death, and on returning home was made first maj.gen. of the Conn. state militia. He was in command at Danbury, Conn., 1776–7, raising recruits and provisions; and on an attack by Gov. Tryon's troops 1777, Apr. 26, had command of 200 men, who came upon Tryon's force n. of Ridgefield, and after a successful assault were shattered in a second assault by artillery fire, with the mortal wounding of their leader while seeking to rally his men.

WOOTZ, n. *wôts:* a superior quality of finely damasked hard cast-steel imported from India, and of which it is said the celebrated Damascus sword-blades were made. Faraday found aluminium in a sample which he analyzed, and referred its peculiar properties to the presence of this metal; but other chemists have failed to find the aluminium.

WOP, v. *wŏp:* same as WHOP (q.v.).

WORCESTER, *wôrs'tèr:* city, one of the caps. of Worcester co., Mass.; on the Blackstone river, and on the Boston and Albany, the Boston and Maine, the Fitchburg, the New York and New England, the New York Providence and Boston, and the Worcester and Shrewsbury railroads; 43 m. n.w. of Providence, 44 m. s.w. of Boston; area 36 sq. m. It is the second city in size in the state, is in a highly cultivated agricultural region, and is noted for its large and varied manufactures and for its educational institutions. It is substantially built and regularly laid out, and has two public parks: one, the 'old common,' contains an imposing soldiers' monument by Randolph Rogers, and a monument to Col. Timothy Bigelow of revolutionary fame. In 1891 the city had 195 m. of streets, improved sewerage system with 60 m. of sewers, 100 m. of water mains, 514 gas lamps, 201 electric lights, police dept. of 94 officers and men (annual cost $73,332), fire dept. of 4 engines and 142 men (annual cost $50,000), water system with reservoir capacity of 1,200,000,000 gals. average daily water consumption 4,753,680 gals. On 1903, Feb. 1, the total bonded debt was $10,460,000, sinking fund $4,810,958; total net debt $5,649,042, and the assessed valuation, real estate $90,140,650, personal $26,090,073—total $116,230,723; tax rate $16 per $1,000. The net public debt of W., (1905) was $6,233,390; assessed value of all taxable property, $120,865,502. The tax rate is $1.70. There were 7 national banks (cap. $1,650,000). Of churches there were 73—viz., Congl. (evangelical) 18; Prot. Episc. 14; Bapt. 13; Meth. Episc. 11; Congl. (Unit.) 4; Univ. 3; Luth. 3; Hebrew 2; Christadelphian 2; and Armenian Free Bapt., Disciples, Friends, Presb., Second Adv., and Meth. Episc. African Zion, each 1.

WORCESTER.

In the school year 1901–2 W. had 22,522 children of school age (5–15 years), of whom 16,910 were enrolled in the public schools, and 14,705 were in average daily attendance. There were 71 public-school buildings, with seating capacity for 22,559 pupils, and 53 male and 501 female teachers; 1 classical high school with 29 teachers, 317 male and 393 female (710) pupils, vols. in library 2,817, value of grounds, buildings, etc., $195,000; 1 English high school with 34 teachers, 392 male and 570 female (962) students, vols. in library 1,575, value of grounds, buildings, etc., $190,000. The State Normal School, opened 1874, had 15 instructors, 10 male and 208 female pupils; value of grounds and buildings $202,700; receipts from the state $23,375. Among the private secondary schools were: Worcester Acad. for boys, opened 1834, which had 14 teachers, 207 students, $500,000 in grounds and buildings, 2,500 vols. in library; the Highland Milit. Acad. (Prot. Episc.), 1856, which had 8 teachers, 52 students, $35,000 in grounds and buildings. Of the two colleges of liberal arts, the older is the College of the Holy Cross (Rom. Cath.), founded 1843, which had 39 profs. and instructors, 372 students, 21,000 volumes in the library, value of scientific apparatus and library $28,000, value of grounds and buildings $500,000; Clark Univ., chartered 1887, opened 1889, Oct. was founded on a preliminary gift of $2,000,000 by Jonas G. Clark. It is patterned after the most approved German universities; has 5 related faculties —mathematics, physics, chemistry, biology, and psychology —and aims chiefly to promote original research and advanced study; hence advanced students only are received. There are 10 fellowships of $600 a year and 20 of $400, established by the founder; also 20 scholarships (see CLARK UNIVERSITY). W. is the seat of a noted scientific school, the Worcester Polytechnic Institute, chartered 1865, which had (1900–1) 32 profs. and instructors, 270 students, 65 scholarships, 7,000 vols. in library, scientific apparatus and library valued at $221,573, grounds and buildings, $507,000, productive funds $875,285, income from state appropriation $72,782, total income $204,289, benefactions $10,000. The U. S. report for 1899–1900 gave for W., in addition to the school and college libraries, the Amer. Antiquarian Soc. library (founded 1812) 100,000 vols.; City Hospital (1872) 1,000 vols.; Free Public (1859) 128,196 vols.; Westchester Co. Horticultural (1842) 3,000 vols.; Worcester Co. Mechanics' Assoc. (1843) 13,431; Worcester Lunatic Hospital (1878) 3,000 vols.; Worcester Soc. of Antiquity (1875) 16,000 vols.; total 384,000. There are circulating subscription libraries. The principal industries of W., are wire works, the largest in the world, the manufacture of looms, woolen and cotton products, elevators, railroad cars, emery wheels, wrenches and tools, organs and pianos and other musical instruments, boots and shoes, carpets, firearms, printing and publishing products, envelopes, marble and stone products, lumber products, leather goods, men and women's clothing and food products.

WORCESTER.

In 1890 W. had 996 manufacturing establishments, which employed $25,230,620 capital and 21,729 persons, paid $11,694,121 wages, used materials valued at $21,208,-904, and yielded products valued at $39,533,869. The two wire-manufacturing establishments (one the largest in the world) employ 4,000 hands, and yield products of iron, copper, and steel wire valued at $8,000,000. Other leading industries according to capital employed were: foundry and machine-shop products, 78 establishments, capital $4,501,791, employees 3,575, wages $2,200,179, materials $2,333,293, products $5,472,417; boots and shoes (factory product), 15 establishments, capital $1,502,823, employees 1,571, wages $804,031, materials $1,709,979, products $2,923, 545; woolen goods, 14 establishments, capital $1,-169,399, employees 923, wages $356,367, materials $835,-749, products $1,374,857; lumber, planing-mill products, sash, doors, blinds, etc., 8 establishments, capital $574,300, employees 333, wages $210,942, materials $339,046, products $630,571; carpentering, 69 establishments, capital $526,330, employees 999, wages $734,201, materials $1,186,-579, products $2,107,628. In 1900 there were reported in W. 1,071 manuf. estab. employ. $42,966,742 capital and 25,593 persons, paying $12,894,781 for wages and $26,-666,176 for materials used, and yielding products valued at $53,348,783.

W. was settled 1674, on a tract 8 m. sq., purchased from the Indians for £12, New England money; but owing to the troubles incident to the King Philip (q.v.) war, no permanent settlement was made till 1713. W. received a city charter 1848. Pop. (1910) 145,986.

WORCES'TER: city, capital and assize town of the county of Worcestershire, England, and a county of itself; on the Midland and the Great Western railways; near the centre of the Severn valley, principally on the e. bank of the Severn; about 26 m. s.w. from Birmingham, 120 m. from London by rail. W. is of great antiquity; there are abundant traces of ancient iron-smelting works on the banks of the river, assigned by antiquaries to the times of the Roman occupation; and the frequent discovery of other remains proves that the city was a Roman station. The Romans found here a British settlement, which they made a military station, calling it Vigorna: the Saxons called it Wigorna-ceaster, whence the present name. The chief object of antiquity now existing is the cathedral, beautifully placed on a gentle elevation on the e. bank of the river. A cathedral, dedicated to St. Peter, was founded here as early as the 7th c. In 1084 Bp. Wulstan laid the foundation of a new cathedral, many portions of which remain in the present structure, such as the crypt (one of the oldest and most interesting in England), the bases of and fragments in many of the walls, chapter-house, refectory, and cloisters. In the civil wars much damage was done to the building, though none of its leading features were destroyed. It is now distinguished by the simplicity, if not plainness, of the exterior, which is amply

compensated by the fine perspective, the lofty roof, and generally charming effect of the interior. As the cathedral had long been much out of repair, a thorough restoration was commenced 1855 under the late Sir G. G. Scott, and completed under Perkins at a cost of about £100,000. The tombs of King John, and of Arthur, Prince of Wales (eldest son of Henry VII.), are the chief ancient monuments in the building. The Episcopal Palace in the city has been transformed into the Deanery; and the bp. of W., since the ecclesiastical commissioners assumed the management of the episcopal and capitular estates, has his residence at Hartlebury Castle. The Bishop of W.'s revenue has been fixed by the ecclesiastical commissioners at £5,000; and the livings in his gift are numerous and of considerable value. Worcester chapter consists of the dean, 4 canons, 24 honorary canons, and 4 minor canons, including the precentor. Besides 10 chorister boys, there are 40 other boys on the foundation at the College or Cathedral School, who receive gratuitous education, and about 60 non-foundation boys. There is also a city grammar school, founded by Queen Elizabeth, and largely attended. The 11 parish churches of the city are poor specimens of architecture. The city does not shine in public buildings. Next to the cathedral, the most important are the Shire Hall, the Guildhall, and the county prison; but there are also the city library, the W. Museum, a corn exchange, and music-hall. The battle of W., 1651, is memorable in history, and Charles II., to commemorate the fidelity of the citizens to his cause, granted the motto to the city arms, 'Civitas in bello et in pace fidelis.'

The people are employed in glove-making, including leather dressing and staining; in porcelain factories; iron-works, including locomotive-engine factories; tanning and currying, horse-hair weaving, vinegar, British wine and sauce making, and coach-building. Chemical manures and agricultural implements are manufactured. Glove-making is still considered the staple manufacture; but one large factory has absorbed a large portion of the business, and now there are scarcely one-fourth as many master glovers as half a century ago. There are two porcelain factories, employing about 500 hands. The Royal Porcelain Works are celebrated for taste in designing, and for beauty of execution of the highest class of productions; while the specialty of the other factory is utility, combined with purity of design and excellence in workmanship. The glazed semi-porcelain is also famous. Hops are grown in the neighborhood; and there is trade in malt, grain, and coal. There are a daily and four weekly newspapers, one of the latter the oldest provincial paper in England (founded 1690).—Pop. parliamentary borough (1881) 40,354; (1891) 42,905; (1901) 46,623.

WORCESTER POLYTECHNIC INSTITUTE.

WORCESTER, South Africa: a town of Cape Colony, 60 m. n.e. of Cape Town, 109 m. by rail through Paarl and Tulbagh. The town is regularly laid out, the streets being planted with trees. It is well supplied with water from the Hex river. The vine is extensively cultivated in the neighborhood, and brandy and wine are made in considerable quantity. Pop. 6,000.

WORCESTER COLLEGE: Oxford, England, originally called Gloucester Hall, was founded in 1714 by Sir Thomas Cookes of Bentley, Worcestershire, for a provost, six fellows, and six scholars. Under the statutes of 1882 Worcester College consists of a provost, 9 or 10 fellows, and 19 scholars. There are a number of exhibitions, two of which are connected with the Charterhouse School, and three with Bromsgrove School.

WORCESTER POLYTECHNIC INSTITUTE: a technical school located at Worcester, Mass. It was founded by a gift of $100,000 from John Boynton of Templeton; was chartered in 1865, and opened to students in 1868. Since that time its resources have been largely increased both by private benefactions and state donations. Though one of the earliest schools of the kind in the United States, it has in every way kept pace with the progress in scientific and technical education, and is recognized as one of the leading American technical schools. From the time of its organization, laboratory and shop work has been a distinctive feature of its work; it was one of the first schools to emphasize the importance of laboratory methods, and the first in the United States to establish a workshop as an essential part of the training in mechanical engineering. The students maintain a Christian Association, chapters of several Greek letter fraternities, and an Athletic Association. The institute publishes a bi-monthly *Journal*, containing original articles on technical and scientific subjects by the alumni and faculty, and news of the institute and general scientific progress. The institute campus comprises 12 acres on a slight elevation in the northwestern part of the city; it slopes on the north to Institute Park. The buildings on this campus are Boynton Hall, the Washburn Shops (machine and forge), the Salisbury Laboratories (chemistry, physics, and electrical engineering), the engineering laboratories (mechanical engineering), the power laboratory, the foundry, and the high potentials laboratory; the institute also owns Newton Hall, a dormitory a short distance from the campus, and a hydraulics laboratory at Chaffins, 5 m. distant. The laboratories and shops are all excellently equipped; the library contains 10,000 volumes besides departmental libraries; the Worcester Free Public Library, and the library of the American Antiquarian Society are also open to students. Free tuition is given to 40 Massachusetts students in consideration of which the institute receives an annual state appropriation. The

students number about 300; the total number of graduates is 1,106.

WORCESTER, Dean Conant: American educator: b. Thetford, Vt., 1866, Oct. 1. He was graduated at the University of Michigan in 1889, having previously accompanied the Steere scientific expedition to the Philippine Islands in 1887-9. He was instructor in animal morphology at the University of Michigan 1893-6, becoming assistant professor in the last named year. In 1890-2 he again traveled in the Philippines, with F. S. Bourns, in a tour known as *The Menage Scientific Expedition*, and in January, 1899, was appointed one of the United States commissioners to the islands to investigate and report on conditions there. He has published: *Preliminary Notes on Birds and Mammals Collected by the Menage Scientific Expedition to the Philippine Islands* (1894); *Contributions to Philippine Ornithology* (1898); *The Philippine Islands and Their People* (1898).

WORCES'TER (Edward Somerset), second Marquis of: English inventor: about 1601-67. During the civil war he was a zealous defender of the royalist cause. Although regarded as a mere speculator by his contemporaries, Worcester invented the first working Steam-engine (q.v.): it could raise a column of water 40 ft. in height, and was set up at Vauxhall, near London. This is described in his *Century of Inventions* (1655; reprinted in Dirck's *Life and Times of Marquis of Worcester*, 1865), also in his *Exact and True Definition of the Most Stupendous Water-commanding Engine*, etc.

WORCESTER, Joseph Emerson, LL.D.: lexicographer: 1784, Aug. 24—1865, Oct. 27; b. Bedford, N. H. Employed in farm-work, he prepared himself late for entering the junior class at Yale, graduating 1811. He taught in Salem, Mass., studied at Andover, and began literary work there, publishing *A Geographical Dictionary* (2 vols. 1817), and a *Gazetteer of the United States* (1818). He removed to Cambridge, and published *Elements of Geography, Ancient and Modern* (1819); *Sketches of the Earth and Its Inhabitants* (1823); *Elements of History*, and a *History Atlas* (1826); *Epitome of History* (1827); *Outlines of Scripture Geography* (1828); *Longevity and the Expectation of Life in the United States* (Transactions of American Academy of Sciences, 1826); an edition of Johnson's Dictionary (1828); an abridgment of Webster's Dictionary (1829); and his own *Comprehensive Dictionary* (1830). He edited the *American Almanac* 1831-45. In 1831 he went to Europe to get material for his *Universal and Critical Dictionary of the English Language*, which was published 1846. For the next three years he was incapacitated for work by cataract of the eyes, which was removed by surgery. He issued editions of his dictionary, with enlargements, 1847-55.

The quarto by which he is now best known, *Dictionary of the English Language*, was published 1860, having been prepared with expert help in many departments. It was preferred by many who adhered to usage instead of the slight modifications in spelling introduced into the earlier editions of Webster, and it was indispensable to the English scholar for comparison of definitions with Webster's. Cambridge and Boston gave it the preference as a home product. It is said to have been the first dictionary with illustrative engravings; but the *Youth's Lexicon*, in the first part of the 19th century, though a small octavo, was prior, as were also other works that pictured as well as defined, such as Brande's *Dictionary of Literature, Science, and Art.* Dr. Worcester's work is a monument of industry and learning, which was recognized by his election to many learned societies. A memoir of him by Ezra Abbot was read to the American Academy of Sciences 1866.

WORCES'TER, NOAH, D.D.: Unitarian minister: 1758, Nov. 25—1837, Oct. 31; b. Hollis, N. H. At an early age he was fifer in the patriot army 1775-77, having part in the battles of Bunker Hill and Bennington; afterward taught school at Plymouth, N. H.; was a member of the legislature after 1782; became a minister, and was pastor of the church in Thornton 1787-1802; home missionary in New Hampshire 1802; preached in Salisbury, N. H., 1810-13, and after that lived in Brighton, Mass., editing the *Christian Disciple* 1813-18, and the quarterly *Friend of Peace* 1819-29. He was founder of the Massachusetts Peace Society 1815, and its secretary 13 years. Among his publications were: *Familiar Dialogue Between Cephas and Bereas* (1792); *Bible News* (1810); a volume on the divinity of the Son of God (1810); *Respectful Address to the Trinitarian Clergy* (1812); *Solemn Review of the Custom of War* (1814); *The Atoning Sacrifice* (1829); *The Causes and Evils of Contentions Among Christians* (1831); *Last Thoughts on Important Subjects* (1833). See *Memoirs* by Dr. Henry Ware (1844). He died in Brighton, Mass.

WORCES'TER, SAMUEL, D.D.: Congregational minister: 1770, Nov. 1—1821, June 7; b. Hollis, N. H.; brother of Noah Worcester. He graduated at Dartmouth 1795; was pastor in Fitchburg, Mass., 1797-1802, and in Salem 1803 until his death. He was also corresponding secretary of the American Board of Foreign Missions from 1810. He died in Brainerd, Tenn., on a journey for his health. He published *Discourses on the Covenant with Abraham* (1805); *Letters to the Rev. William E. Channing on Unitarianism* (1815); *Watts's Entire and Select Hymns* (1818); and a volume of his sermons was published two years after his death. His collection of hymns was in general use for many years. See his *Life and Labors* (1852), by his son Samuel Melancthon Worcester (1801-66), who was professor of rhetoric and

oratory at Amherst College 1825-34, pastor of his father's church at Salem 1834-60, senator and representative in the state legislature, and author of *Essays on Slavery by Vigorinus* (1826).

WORCES'TER, THOMAS, D.D.: Swedenborgian minister: 1795, Apr. 15—1878, Aug. 12; b. Thornton, Mass.; son of Dr. Noah Worcester. He graduated at Harvard 1818, studied theology there, and was the first minister of the Swedenborgian communion in Massachusetts. He was pastor of the Society of the New Jerusalem Church in Boston 1821-67, president of the Massachusetts Association of that faith, and presided at the general conventions of the New Church 1839-75. He was an overseer of Harvard 1854-60. An industrious and able writer in advocacy of the Swedenborgian doctrines, he published only occasional sermons, addresses, and articles. He was a man greatly esteemed for refinement and beauty of character.

WORCES'TERSHIRE: one of the w. midland counties of England; having for its conterminous counties those of Warwick and Stafford on the n., Warwick and Oxford on the e., Gloucester on the s., and Hereford and Salop on the w.; 472,453 acres, of which about 400,000 are cultivated; greatest length 38 m., greatest breadth 26. The surface is undulating, and there are depressed valleys and hilly ranges. On the w. the hilly range terminates in the Malvern Hills, one of the highest points of which is the Worcestershire Beacon, about 1,100 ft. above sea-level; but the highest peak of the range is the Herefordshire Beacon, in the county of Hereford. The e. range is the Bredon Hills. The county is well watered, and finely timbered, especially with fruit-trees. The elm grows luxuriantly and is common everywhere. The oak, beech, and other timber-trees thrive well, and the larch has been much planted. The principal rivers are the Severn, the Teme, and the Avon. The Severn is navigable for vessels of 80 tons as far as Worcester, and of 60 tons to Stourport, 14 m. farther; and smaller boats can reach Shrewsbury, the river being thus navigable 180 m. There are three canals communicating with the Severn. The Worcestershire portion of the vale of Severn is about 30 m. long; the climate is mild and healthful; but the rainfall is small, and nearly the minimum of England. There are mineral springs at Malvern, Evesham, Dudley, and Kidderminster. Nearly the whole county is on the red sandstone formation, but the Malvern and Lickey Hills are of igneous origin. The soil is almost every variety suitable for vegetation, from strong deep clay and rich vegetable mold to light friable sandy rye-land, with tracts of alluvial deposit, marl, and loam. The vale of Evesham is dependent on the Avon for its fertility, which has long gained for it the reputation of being the garden of the middle west: it produces abundance of table-fruit, and vegetables of finest quality. High-farming is much

in vogue. Excellent crops of wheat and other grains, turnips, and potatoes are raised; a large portion of the land remains in meadow, and much of it ancient pasture.

Hop-gardens are plentiful in the w. division, and their product ranks, in the estimation of brewers, next to that of East Kent. Worcestershire is *par excellence* a berry county, as Herefordshire and Devonshire are cider counties. Its pear orchards are very beautiful in the time of blossom; and there is a splendid variety, the 'black pear of Worcester,' which attains great size and is supposed to be the traditional pear blazoned on the county's shield of arms.

There is no distinctive local breed of stock, either cattle or sheep. The markets are well supplied with butcher meat, bred and fed in the county; and London, Birmingham, and the 'Black Country' draw large supplies from Worcestershire. The county has great mineral wealth in coal, iron, salt, lime: the first three are found in the n.e.; lime is generally distributed. Coal and iron mines are largely worked near Dudley. Iron-works abound between Dudley and Stourbridge, where are large manufactures of ornamental glass; and there are abundant coal mines in the neighborhood.

The textile fabric manufactures are nearly confined to carpet-weaving, long carried on at Kidderminster; though that town has almost ceased to produce the carpets known by its name, 'Brussels' and 'tapestry' principally being manufactured. Worcestershire china, which has gained world-wide reputation, is produced on a large scale in Worcestershire. At Redditch the needle and fish-hook manufacture is carried on to a greater extent than in any other place in England; nail-making has been practiced for centuries at Bromsgrove; and at Droitwich, about 6 m. from Worcester, salt has been manufactured for many centuries from an inexhaustible supply of brine. Pop. (1901) 358,356.

WORD, n. *wėrd* [Goth. *vaurd;* Dan. and Sw. *ord;* Dut. *woord;* Ger. *wort,* word: Lith. *wardas,* name: allied to L. *verbum,* a word]: a single part of speech; an articulate sound, or combination of sounds, expressing an idea; a vocable; the letters which represent such a vocable; a term; talk; discourse; an order; signal; Password (q.v.); tidings; a message; a dispute; a declaration; promise, as to pass one's *word* (implying obligation or good faith); in *OE.,* a motto; a proverb: V. to express in words. WORD'ING, imp.: N. the act or manner of expressing in words. WORD'ED, pp. WORD'Y, a. *-ĭ,* using many and needless words; full of words; verbose; verbal. WORD'ILY, ad. *-lĭ.* WORD'INESS, n. *-nĕs,* the state or quality of abounding in words; verbosity. WORD'LESS, a. *-lĕs,* silent. WORD'-BOOK, a vocabulary or collection of words arranged in alphabetical or other regular order. A GOOD WORD, commendation; an expression to edify or instruct. GOOD WORDS, words spoken or written for improvement; wise

instruction. IN WORD, in declaration or resolution only. IN A WORD, briefly; to sum up. BY WORD OF MOUTH, orally; by actual speech, and not by a written message. THE WORD, one of the titles of Jesus Christ, the Son of God; same as *The Logos* (q.v.): also the Scriptures pre-eminently. WORD FOR WORD, in the exact order of words; verbatim. TO EAT ONE'S WORDS, to retract what has been said.

WORDE, *wawrd*, WYNKIN DE: early printer, brought to England by William Caxton (q.v.) on his return about 1477: b. Lorraine; d. London about 1534. Caxton made De Worde's acquaintance at Cologne. De Worde superintended Caxton's printing-office till the latter's death, and afterward succeeded him. He made great improvements in the art of printing, especially in type-cutting, then a branch of the profession. He is said to have introduced Roman letters into England, using them as we now use italics. In some of his books he even introduced a sprinkling of Greek, Hebrew, and Arabic, produced in wood-cut. He also made extensive use of engravings, which, however, appear to have been obtained mostly from the continent. The books printed by him are generally distinguished by their neatness and elegance, and far exceed in number those of his predecessor, being 408 distinct works against 99 by Caxton.

WORDEN, *wėr'dėn*, JOHN LORIMER: naval officer: b. Westchester co., N. Y., 1818, Mar. 12; d. 1897, Oct. 18. He entered the navy as midshipman 1835, Jan. 12; became passed midshipman 1840, July 16; was promoted lieutenant 1846, Nov. 30, and saw varied service until the civil war, when his delivery of orders from the secretary of the navy, 1861, April, saved Fort Pickens to the Union. In returning from this service he was arrested by the Confederates and made prisoner for seven months. On being exchanged he was sent to take command of the Ericsson *Monitor*, then approaching completion; and on a summons to the scene of war hastily made in the ill-prepared vessel a stormy and perilous passage from New York, reaching Fortress Monroe 1862, Mar. 8, at 10 P.M. He went at once to the aid of the *Minnesota*, which was lying aground opposite Newport News, where the Confederates had the day before sunk the *Cumberland*, driven the *Congress* ashore, and shown that their iron-clad *Merrimac* was apparently irresistible. On the next morning (Sunday) the *Monitor* went into battle about 8, when the Confederate ram was approaching to destroy the *Minnesota*. The *Monitor* quickly scattered the steamers and other craft supporting the *Merrimac*, and hotly fought the iron-clad from three to four hours, at from 600 to 150 ft. distance, using two guns with 178-pound cast-iron shot, against the eight guns of the *Merrimac* fired as rapidly as possible. The *Monitor* was struck 22 times, but wholly escaped injury, even when rammed by her antagonist, and proved not only more than a match

for the *Merrimac*, but the prototype of a new instrument of war. Capt. Worden suffered a severe wounding of his eyes and temporary blindness through a shot striking the observation slit of the pilot-house, but he soon recovered. This engagement, though a drawn battle, saved the United States fleet from destruction, and Washington, New York, and other cities from capture. Worden received from congress votes of thanks 1862, July 11, and 1863, Feb. 3; was promoted captain and commanded an iron-clad in the s. Atlantic squadron 1863, Jan.—June; was on duty at New York 1863-66, and in the Pacific squadron 1866-7; was promoted commodore 1868, May 27, commissioned rear-admiral 1872, Nov. 20, and was superintendent of the Naval Academy 1870-74. He was in chief command of the European squadron 1875, Feb. 3—1877, Dec. 23, then member of the naval examining board, and president of the retiring board until 1886, Dec. 23, when he was retired by special act of congress, with the highest sea pay of his grade.

WORDSWORTH, *wĕrds'wĕrth*, CHARLES, D.C.L.: 1806, Aug. 22—1892, Dec. 4; b. Bocking, Eng.; son of Dr. Christopher Wordsworth (master of Trinity College, Cambridge) and nephew of the poet. He was educated at Harrow and Oxford, taking high prizes and 'first classes'; was known also as an athlete; and graduated B.A. 1830. He continued his Oxford residence several years as private tutor, having among his pupils William E. Gladstone and Cardinal Manning; was second master of Winchester College 1835-45; warden of Trinity College, Glenalmond, 1846-52, and then was elected bishop of St. Andrews, Dunkeld, and Dunblane. He was one of the New Testament revision committee. Among his publications are: *Christian Boyhood in a Public School* (1846); *On Shakespeare's Knowledge of the Bible* (1854); *A United Church for a United Kingdom* (1860); *The Outlines of the Christian Ministry Delineated* (1872); *Discourse on Scottish Church History from the Reformation to the Present Time* (1881); *Shakespeare's Historical Plays* (1883); *Public Appeals in Behalf of Christian Unity* (1886); *How to Read the Old Testament*, a letter to his Grandchildren (1887); and *Ecclesiastical Union Between England and Scotland* (1888). His occasional publications, such as *Letter to the Rt. Hon. W. E. Gladstone on Christian Instruction*, and *Opinions* in the cases of the bishop of Brechin and the Rev P. Cheyne, are very able.

WORDS'WORTH, CHRISTOPHER, D.D.: Anglican prelate: 1807-1885, Mar. 21; nephew of the poet William Wordsworth; b. Ashby. He graduated 1830 at Trinity College, Cambridge, where he took high honors, medals, and a fellowship; travelled in Greece 1832-3; was appointed public orator at Cambridge 1836; was headmaster of Harrow School 1836-44; canon of Westminster 1844; vicar of Stamford-in-the-Vale 1850; and was con-

secrated bishop of Lincoln 1869. His publications were very numerous; besides those of an official character, are: *Athens and Attica* (1836); *Inscriptiones Pompeianæ* (1837); *Greece* (1839); *Discourses on Public Education* (1844); *Diary in France* (1845); and volumes on the Church of Rome (1847), the sacred canon (1848), the Apocalypse (1848), the mystic Babylon (1850), inspiration (1861), interpretation (1861), the Church of Ireland (1866), the Maccabees (1871), the intermediate state (1875), future rewards (1878), the revised version (1881); also *Miscellanies* (1879); *The Church Sunday* (1880); *A Church History* (1881-83); *John Wicliff* (1884); and *Christian Womanhood* (1884).—His father, CHRISTOPHER WORDSWORTH, D.D., youngest brother of the poet, 1774, June 4—1846, Feb. 2; b. at Cockermouth, graduated at Cambridge. After a number of chaplaincies and rectorships, he was master of Trinity College, Cambridge, 1840-41; was author of *Ecclesiastical Biography* (6 vols. 1810, 4 vols. 1853); and *Christian Institutes*, selections from the writings of English divines (1836); and other works.

WORDSWORTH, CHRISTOPHER, M.A.: English Anglican clergyman and scholar, second son of Bishop Christopher Wordsworth (q.v.): b. Westminster 1848, Mar. 26. He was educated at Trinity College, Cambridge, in 1870-88 was a fellow and tutor of Peterhouse College, and in 1877 was appointed rector of Galston, in Rutland. In 1886 he became a prebendary of Lincoln cathedral, and in 1889 rector of Tyneham, Dorset. Since 1897 he has been rector of St. Peter's, Marlborough. His published works comprise: *University Society in the 18th Century* (1874); *Scholæ Academicæ* (1877); *Breviarium ad Usum Sarum* (1879-86), edited with F. Procter; *Pontificale Ecclesiæ S. Andreæ* (edited 1885); *Lincoln Cathedral Statutes* (1892-7), edited with H. Bradshaw; *Coronation of King Charles I.* (1892-4); *Mediæval Services* (1898); *Sarum Pye*, and *Salisbury Processions* (1901); etc.

WORDSWORTH, DOROTHY: English writer: b. Cockermouth 1771, Dec. 25; d. Grasmere 1855, Jan. 25. She was the only sister of the poet, and was a woman of remarkable mental powers, who described country life with keen observation and much literary skill. Besides her *Recollections of a Tour in Scotland* (1874) other journals and letters of hers have been published.

WORDSWORTH, ELIZABETH: English educator, daughter of Bishop Wordsworth: b. Harrow 1840. She is principal of Lady Margaret Hall, Oxford, and published: *Illustrations of the Creed* (1889); *Illustrations of the Decalogue* (1893); *Life of Bishop Christopher Wordsworth* (1888); *Saint Christopher and Other Poems* (1890); *The Snow Garden and Other Stories* (1895).

WORDSWORTH, JOHN, D.D : Anglican bp. of Salisbury, b. Harrow, Eng., 1843, Sep. 21; son of Christopher W., and nephew of Charles W. He graduated at Oxford Univ., 1865; was asst. master at Wellington College, 1866–7; fellow of Brasenose College, 1867–8, and tutor there 1868–83; ordained deacon 1867, and priest 1869; prebendary of Lincoln 1870–83; examining chaplain to the bp. of Lincoln, 1870–85; proctor of Oxford Univ. 1874, and select preacher 1876; Bampton lecturer 1881; Oriel prof. of the interpretation of Holy Scripture 1883; canon of Rochester 1883; and became bp. 1885. He published numerous lectures, and for many years was engaged in preparing an edition of the Vulgate New Test., of which part I. was issued 1889, part II. 1890.

WORDSWORTH, WILLIAM, D.C.L.: English poet, 1770, Apr. 7—1850, Apr. 23; b. Cockermouth, in Cumberland; second son of John W., attorney, and agent on the estates of the Earl of Lonsdale. He was sent to school at Penrith, where his parents had gone to reside; and after the death of his mother, 1775, was transferred to the public school at Hawkshead, in Lancashire, 1778. In 1783 his father died, leaving his family with no large possessions. A considerable sum which was due from Lord Lonsdale that eccentric nobleman would not pay—resisting the claim with all legal impediments. There was enough, however, with some assistance from relatives, to carry forward the education of the children. W. remained at Hawkshead till 1787, in which year he was entered at St. John's College, Cambridge: here he remained four years. In the assigned studies his interest was slight; but in his own fashion he was a diligent student; and poetry became more and more his favorite pursuit. In 1791, Jan., he left Cambridge, taking his degree as bachelor. During the previous autumn, he, with a fellow-student, had made a pedestrian tour through France, then in the early fervors of its great Revolution; and thither, after leaving college, he returned. His sympathy with the aims of the Revolution was passionate, and with the party of the Gironde he seems to have cultivated relations so intimate that in the end they might have seriously compromised him, had not circumstances, probably of the pecuniary sort—the cutting off of supplies from his relatives—determined his return to England not long before his French friends were sent in a body to the scaffold. The republican principles which at this time he held he lived to renounce in favor of a reasoned conservatism; and opposed as he was at first to the war against France, no one more patriotically urged it when the struggle became in effect a life-and-death grapple on the part of England with the military despotism of Napoleon.

In 1793 W. came before the public as author, in two poems—*An Evening Walk, addressed to a Young Lady;* and *Descriptive Sketches, taken during a Pedestrian Tour among the Alps.* These pieces abound in touches of refined and original observation of nature, but otherwise are not remarkable; and they failed to make any impression, except on a few minds, such as that of Coleridge, then at Cam-

bridge, who afterward professed to have discerned in them a great undeveloped genius. W. was now in much perplexity; his little finances were almost exhausted; he had at this time an aversion to the priestly profession, which his friends would have had him enter; poetry had become with him a passion, to which he longed to dedicate himself; and unhappily it appeared that *his* poetry would not *pay*. As a poet cannot live like a singing-bird by pecking about the hedgerows, it became necessary for him to find some means of support; and he was on the point of going to London, to do liberal politics for the newspapers, when unexpected relief came in the shape of a legacy from an intimate friend and admirer, Raisley Calvert, who at his early death, 1795, was found to have bequeathed to W. £900, expressly that he might have leisure for a few years for undisturbed development of his powers. Small as the sum may seem, it sufficed for a term of years to a man of the poet's simple tastes and entire singleness of aim. With his only sister, Dorothy, his attached companion through life, and always a devout believer in the brother whose genius she shared, he settled at Racedown Lodge, Dorsetshire, removing 1797 to Alfoxden, Somersetshire, to be near Coleridge, who had established himself within two miles at Nether-Stowey. Out of the intimacy thus begun, came the famous *Lyrical Ballads*, published 1798 by Cottle of Bristol, as a joint adventure of the two poets. The volume had no success; but few men have ever been more serenely self-appreciative than W.; and he did not allow himself to be disheartened by the neglect of the world. After a short tour in Germany, with his sister and friend, he returned to his native Cumberland, which he never again permanently left. He settled first at Grasmere; 1808 he removed to Allan Bank, in the vicinity; and 1813 he transferred his household to Rydal Mount, which remains specially associated with his memory. On the death of the old Lord Lonsdale, the justice of the claim of the Wordsworths against the estates was admitted; and 1802, when W. and his sister must have been near the end of Calvert's convenient legacy, a sum of about £8,000 was by Lord Lonsdale's successor made over to the family. Henceforth a modest competence was secure to them; and W. was wedded within the year to Mary Hutchinson, his cousin, with whom he had been intimate from his childhood. In 1813, by the kindness of Lord Lonsdale, he was appointed distributor of stamps for the county of Westmoreland, a situation which brought him little work, and a salary of £500 a year. When, the year following, he published his great poem, *The Excursion*, he dedicated it to Lord Lonsdale, in a sonnet expressive of 'high respect and gratitude sincere.' Meantime, pending the appearance of this elaborate work, the reputation of the poet had been surely though slowly rising. In 1800 he had published, in two vols., a second edition of the *Lyrical Ballads*, disjoining his own from those of Coleridge, and adding a quantity of new matter; and 1802 and 5 further editions had been issued. To these succeeded, 1807, a new collection, *Poems, in Two Volumes*. In these earlier writ

ings there was a good deal which seemed almost wilfully to invite ridicule; and for a while W. was the laughing-stock of reviewers, particularly of Jeffrey who, as editor of the great *Edinburgh*, at this time figured as chief Aristarchus of the day. Jeffrey, however, did not fail to recognize the strength and beauty in certain passages scattered through W.'s works. The nickname 'the Lake School' was invented, which, with W., included Coleridge and Southey, who chanced to reside in the same district: it has long since become a name of repute; but in its origin it carried a tone of disesteem. However, it could not be long concealed that these volumes of W., despite occasional eccentricity in choice of mean and impracticable subjects, contained a body of true poetry of singularly fresh and original kind. A select circle of passionate admirers, including men like Leigh Hunt, De Quincey, and Wilson, eagerly pressed W.'s claims; and after the publication of *The Excursion*, a volume of high and serious verse, gravely defective in plan, and at times heavy and tedious, but with little trace of the poet's earlier oddities, it came more and more to be felt that the laughers were getting the worst of it; and that W., however he might now and then indulge himself in whimsical tricks, was really a man of true and lofty genius, against whom ridicule could not permanently avail. The critics' occupation was not yet, indeed, quite gone; and the appearance, 1819, of *Peter Bell*, a poem not without profound merits, but unhappily with a donkey for its hero, allowed them to resume their advantage a little. But, on the whole, the day of idle jeer was over; the tide of genuine appreciation had set in, and it continued steadily, till, long before his death, W. found himself recognized as at the head of the poetical literature of his country. His later days were passed serenely in honor. In 1839 the Univ. of Oxford conferred on him its honorary degree D.C.L. In 1842 a pension of £300 per annum was assigned him by govt.; on receipt of which he ceded, in favor of his son, his situation as distributor of stamps; and on the death of his friend Southey, 1843, he succeeded to the vacant laureateship. Seven years later his serene life came to a peaceful end.—His nephew Christopher W. (q.v.) became bp. of Lincoln 1869. Another nephew, Charles W. (q.v.), became bp. of St. Andrews.—It remains only to enumerate the publications of W. not included above. In 1815 appeared *The White Doe of Rylstone*, followed by *The Waggoner*, and a series of *Sonnets on the River Duddon*. In 1822 he published *Memorials of a Tour on the Continent;* afterward, his *Ecclesiastical Sonnets;* and 1835 *Yarrow Revisited, and Other Poems*, the fruit of a tour to Scotland, memorable by his mournful parting, at Abbotsford, with the dying Scott, which he records in a beautiful sonnet. In 1842 he issued a collected ed. of his works, rearranged as we now have them, in a somewhat fanciful fashion of his own. Shortly after his death was published *The Prelude*, a long autobiographical poem, in blank verse.

By remanding poetry to truth and simplicity of natural feeling as its basis, W did more perhaps than any other

writer of his time to forward the great revival of English poetry in the opening of the 19th century. But he was scarcely the originator of the movement; the new influence was 'in the air'; already Cowper in England, as in Scotland Burns, had preluded to the melodious outburst which was to follow; and Wordsworth has recorded in a well-known stanza his obligations to Burns particularly, as his early guide and exemplar. With the charm of natural simplicity of manner, common to him with these his predecessors, Wordsworth combined a depth of philosophic meditation peculiarly his own; there was born with him, moreover, a passionate susceptibility to effects of beauty in the material world, such as few men can ever have been gifted with; and out of these blended elements arose that mystical communion with nature which pervades the whole body of his poetry and constitutes its truest claim to originality. By diffusion of this, and otherwise, his influence on subsequent English poetry has perhaps been as profound as any of the kind ever exercised, and it has been beneficial. Yet we need not admire all that we find in him. The early ridicule directed against him, though it sinned by excess and disproportion, was really to a great extent deserved. Had he gone on writing nothing but the *Betty Foys* and *Alice Fells* which Jeffrey laughed at, his biography would not have been needed here. It is despite a good deal of this kind of perverse drivel that he is revered. See the memoir by his nephew, Bishop Wordsworth; criticisms by Coleridge, Matthew Arnold, Myers, Shairp, Hutton; also Transactions of the Wordsworth Society. Knight's complete edition of Wordsworth began to appear 1882.

The best editions of Wordsworth's poems are Prof. Edward Dowden's (1892) and Prof. William Knight's (1896; a great improvement on his edition of 1882-6). Macmillan's one-volume edition of 1888, with introduction by John Morley, is the next best. Of the *Selections from Wordsworth* the best are Matthew Arnold's (London 1879) and the one compiled by Knight and other members of the Wordsworth Society (London 1881). Among the criticisms on the poet those in Principal Shairp's *Studies in Poetry and Philosophy* (1876) and his *Aspects of Poetry* (1881), and in Stopford Brooke's *Theology of the English Poets* (pp. 93-286 being devoted to Wordsworth) may be commended; also the volume entitled *Wordsworthiana* (1889), a selection from the papers of the society, including the presidential addresses of Matthew Arnold, Lord Houghton, Lord Selborne, and Mr. Lowell. The society was formed in 1880 and was kept up for seven years. The most complete biography of Wordsworth is that by his nephew, Christopher Wordsworth (2 vols. 1851); but the briefer one in *English Men of Letters*, by F. W. H. Myers (1881), is, on the whole, to be preferred.

WORK, n. *werk* [Goth. *vaurkjan*, to work, to do. AS. *weorc;* Dan. *værk;* Dut. *werk;* Icel. *verk;* Ger. *werk*, work, labor; OHG. *wurcho*, a laborer: Gr. *ergon*, labor]: effort expended in the accomplishment of something; physical or mental labor; toil, whether mental or bodily; operation; employment; something to do, especially as a means of earning a livelihood; that on which labor is expended or on which one is employed or engaged; that which is produced by expenditure of labor; a literary, musical, or artistic production; a building, dock, fortification, or other engineering structure; design or pattern; embroidery; the figures wrought with the needle in embroidery, or the stuff on which the needle is used; action; treatment or management; feat; achievement; a large factory or other similar establishment, commonly used in the plural in this sense but with a singular article, as a salt-*work*, a large engineering *works:* V. to put forth exertion in accomplishment of something; to labor or toil; to be employed, especially in earning a livelihood, as, 'if a man will not *work*, neither shall he eat;' to act; to operate or be effective; to perform the function intended or expected, as, the medicine did not *work*, the plan did not *work;* to be in action or agitation; to ferment, to cause to labor or toil, as to *work* a horse too hard; to prepare by labor; sometimes with *up*, as to *work up* the material; to turn to account by labor or effort; to operate or exploit, as, to *work* a mine; to do or accomplish; to effect, as, to *work* wonders; to perform the necessary steps in solving, as to *work* a sum in decimal fractions; to decorate as by embroidery or the like, as, to *work* a pair of slippers for a birthday present; to sew. WORK'ING, imp.: ADJ. acting; operating; devoted to bodily toil; fermenting: N. motion; operation; fermentation; in the plu., the parts of a mine or quarry in which operations are or have been carried on. WORKED, pp. *wėrkt*, labored; managed; fermented. WROUGHT, v. *rawt*, another pt. and pp. of *work*. WORKS, n. plu. *wėrks*, in *mil.*, a general name for walls, parapets, trenches, etc., thrown up for attack or defense; structures in engineering, as docks, bridges, etc.; the buildings and grounds of a manufacturing establishment; the different parts of a piece of mechanism; in *theol.*, moral duties without faith. WORK'ABLE, a. *-ă-bl*, that can be worked; practicable; that is worth working. WORK'ADAY, a. *-ă-dā*, working-day; laborious. WORK'ER, n. *-ėr*, one who works. WORK'MAN, n. a man employed in manual labor; a mechanic. WORK'-WOMAN, a woman engaged in manual labor. WORK'MANLIKE, a. *-līk*, becoming a skilful workman; well performed; skilful. WORK'MANLY, ad. *-lĭ:* ADJ. skilful; well performed. WORK'MANSHIP, n. *-shĭp*, the style of art or execution, good or bad, shown in any work; that which is effected or produced by manual labor; the skill of a workman. WORK'-BAG, a reticule. WORK'-BOX, a small box or case for articles used in sewing etc. WORK'-FELLOW, one engaged in the same work with another. WORK'-FOLK, persons that labor in certain occupations. WORK'HOUSE, a house for the poor and destitute maintained by the parish or town, a poor-house. WORKING

CLASSES, those who earn their bread by manual labor; laborers, mechanics, and others receiving weekly wages. WORK'ING-DAY, a day on which ordinary labor or business is carried on, as distinguished from *Sunday* or from the Sabbath-day. WORK'ING-DRAWING, a drawing by an architect, engineer, etc., of the whole, or of a part, of any designed structure, machine, etc., made on a scale large enough to serve as a guide to the workmen in executing the design—moldings and ornamental designs are of the actual size. WORK'ING-HOUSE, in *OE.*, a workshop; a factory. WORK'MASTER, a performer of any work. WORK'SHOP, a place where workmen carry on their employment. FIELD-WORKS, in *mil.*, works erected for a temporary purpose in front of any fortification. WORKYDAY, n. *wĕrk'i-dā*, in *OE.*, a workday: ADJ. in *OE.*, of or pertaining to a working-day. TO SET TO WORK, to employ; to engage in any business or labor; to begin work. TO WORK OUT, to effect by toil. TO WORK UP, to employ materials in the manufacturing of articles; to make way; to stir or excite; to exhaust. TO GO TO WORK, to begin labor; to begin operations.—SYN. of 'work, n.': toil; deed; effect.

WORK· the result of a force in overcoming resistance. If we try to lift a ton-weight, however we may fatigue ourselves, we cannot move it, and therefore we do no work. But we can lift with ease a hundred-weight, and then we do more work in proportion as we raise it higher. In lifting coals from a pit, the work done is evidently in proportion to the depth of the pit, and to the weight of the coals raised. We may therefore at once define the *work done by a force* as *the product of the force into the space through which it moves its point of application in its own direction*, and it is usually measured by engineers, and others who do not require absolute accuracy, in *foot-pounds*, the work required to raise 1 lb. one foot high. If the motion of the point of application be in the *opposite* direction to that of the force, the work is done against the force. If the motion be perpendicular to the direction of the force, no work is done by or against the force. Thus, the work spent in opening a massive gate, or in turning a large fly-wheel or grindstone, has nothing whatever to do with the force of gravity—the body moved, in all these cases, is, as a whole, neither raised nor lowered as regards its distance above the earth's surface. If the direction of the force be oblique to the direction in which the point of application moves, we must resolve the force, by the law of the Parallelogram of Forces (see COMPOSITION OF FORCES), into two components, one *in* the direction of motion, the other perpendicular to it. The former is the working component; the latter, as we have just seen, does no work. A good illustration of this is in the case of raising stones from a quarry by carting them up a series of inclined planes, as contrasted with hauling them up vertically: the work done, in either case, is measured by the product of the weight of the stones, and the height through which they have been raised; and thus, for the same load of stones, it will be the same whichever process is adopted

This is evident from the property of the inclined plane—viz., that the force required to support a body resting on the plane (which is the force that has to be overcome when we haul it up the plane) is to the weight of the body as the *height* of the plane to its *length*. Hence, this force, multiplied into the length of the plane, gives the same product as the whole weight into the height of the plane; and these are the two quantities of work which we are comparing.

When work is done on a body, there is always an increase of velocity, unless other forces act on the body, so that it does an equal amount of work against them. Thus, if we push a movable body, such as a cart, along a road, the velocity gradually increases, and would increase indefinitely were there no friction and no resistance of the air (forces against which work has to be done), and could we move fast enough to keep continually pushing it, however great its velocity may become. If, on the other hand, by means of a rope and pulley, we raise a stone, if once started, it will ascend uniformly, so long as we pull with a force just equal to its weight, because then as much work is done on the stone by the hand as it does against gravity. If we pull with a force greater than its weight, we do more work on the stone than it does against gravity, and the upward velocity increases; if with a force less than the weight, the stone has to do more work against gravity than is done on it by the rope, and its velocity upward becomes less. The measure of the excess of work done on a body over that which it does against resistance is *the increase of the product of half the mass into the square of the velocity*—i.e., of what was formerly called the *Vis-viva* of the body, what is now called its *Actual*, or preferably, its *Kinetic Energy:* see FORCE. Hence, as it is evident that if a body, or system, be acted on by a set of forces which are in equilibrium, it will have no tendency to lose or to acquire velocity, its kinetic energy will remain unchanged, and therefore *as much work must be done on it by some of the applied forces as it does against the rest, in any displacement so slight as not to change the circumstances of the particular arrangement.* That is, when forces are in equilibrium on a body, if the body be slightly displaced, the sum of the products of each force by the effective component of the displacement of its point of application is zero—the product being positive when the force does work, negative when work is done against it. This is the celebrated principle of *Virtual Velocities*, the term virtual velocity having been, very inconveniently, applied to what we have called above the effective component of the displacement of the point of application of a force. It was often employed as the basis of the whole of Statics, and very curious attempts have been made to give proofs of it (independent of the laws of composition of forces), especially by Lagrange. But the principle of Work, or Energy, of which that of Virtual Velocities is a mere particular case, and which is at once applicable to the whole range of Dynamical Science, is distinctly enunciated by Newton in a Scholium to his Third Law of Motion: see MOTION, LAWS,

OF. His words are memorable, and should be universally known—*Si æstimetur agentis actio ex ejus vi et velocitate conjunctim; et similiter resistentis reactio æstimetur conjunctim ex ejus partium singularum velocitatibus et viribus resistendi ab earum attritione, cohæsione, pondere, et acceleratione oriundis; erunt actio et reactio, in omni instrumentorum usu, sibi invicem semper æquales.* Newton has defined what he means by the velocity of an agent—viz., the component of the velocity of its point of application which is in the direction of the agent. He has also shown what is the measure of resistance arising from acceleration (see VELOCITY); so that, merely using modern terms instead of those employed by Newton, but in nowise altering the scope of the above remarkable passage, we have the following version of it: *Work done on any system of bodies* (literally, *the parts of any machine*) *has its equivalent in work done against friction, molecular forces, or gravity, if there be no acceleration; but if there be acceleration, part of the work is expended in overcoming the resistance to acceleration, and the additional kinetic energy developed is equivalent to the work so spent.*

When work is expended in overcoming the resistance to acceleration, i.e., the *Inertia* of a body, we have its equivalent in additional kinetic energy. When it is expended against gravity, as in raising a weight or bending a spring, we have it stored up in a dormant form as *Potential Energy:* see FORCE. When it is expended in overcoming friction, there appears at first sight to be no equivalent; but the comparatively recent researches of Joule (q.v.) and others have satisfactorily accounted for its disappearance, by proving its quantitative transformation usually into heat, sometimes into other forms of molecular energy. But to pursue this point would lead us again to questions already treated at some length under the title FORCE. There is one remark, however, which is important: in compressing a gas, in the receiver of an air-gun, e.g., we can never recover as useful effect all the work expended. The reason is, that a gas is *heated* by compression, so that part of the work spent is converted into this heat, conducted through the metal, and by the principle of *Dissipation of Energy* lost, at least in part, to man. Had we a gas which could not be heated by compression (take the imperfect analogy of a space filled with fine spiral springs), we should recover, by allowing it to expand, all the work expended in the compression.

One other remark remains to be made. It will be noticed that Newton speaks of the action of an agent as the product of the agent and the component *velocity* of its point of application. This is what we now call *Rate of doing Work*, or *Horse-power*. Watt estimated a horse-power at 33,000 foot-pounds per minute, or 550 foot-pounds per second. This is probably too high; but it is constantly employed in engineering calculations. A curious quantity, sometimes employed as regards steam-engines, especially those employed for pumping mines, is the *duty*, which is measured by the number of foot-pounds

Description of Work.	Weight raised.	Velocity per Second.	Unit of Work per Second.	Length of Working-day.	Total Work in a Day.
	Lbs.	Feet.	Lbs. × feet.	Hours.	Lbs. × feet
A man mounting an easy staircase, or an incline, without a load, his work consisting simply in moving the weight of his own body...	143	0·5	71·5	8	2,059,200
A man raising weights by means of a cord and pulley, which renders necessary the return of the cord without a load	39·6	0·66 say 0·67	26·53	6	573,048
A man raising weights by his hands	44	0·56	24·64	6	532,224
A man carrying a weight on his back up an easy incline, and returning without a load	143	0·13	18·59	6	401,544
A man raising materials by a wheel-barrow, on an incline of 1 in 12, returning unloaded	132	0·065	8·58	10	308,880
A man throwing earth by a spade a height of 5 feet 4 inches.....	5·94	0·66 say 0·67	3·98	10	143,280
A man working a pin-wheel or a drum—					
1st, at the level of the axle	132	0·5	66	8	1,900,800
2d, at bottom of wheel	26⅔	2·34	61·8	8	1,779,840
A man walking and pushing, or drawing horizontally, in a continuous manner	26·4	2	52·8	8	1,520,640
A workman acting upon a winch	17·6	2·5	44	8	1,267,200
A workman pushing and pulling alternately in a vertical direction	13·2	2·5	29	10	1,044,000
A horse harnessed to a carriage going at a walking pace	154	3	462	10	16,632,000
" " " at a trot	96·8	7·22	699	4·5	11,323,800
A horse in a mill, at a walking pace	99·0	3	297	8	8,553,600
" at a trot	66·0	6·56	433	4·5	7,014,600
An ox in a mill, at a walking pace	132	2	264	8	7,603,200
Mule " "	66	3	198	8	5,702,400
Donkey " "	30·8	2·67	82 24	8	2,368,512

of work done by a hundred-weight of coal supplied to the furnace. A similar mode of comparison is now applied to steam-engines for agricultural purposes, etc.

The quantity of work which can be got from any machine, human, animal, or other, depends in many cases on the rate at which it is done, or the horse-power actually exerted. An average man can easily work at the rate of a horse-power for a few minutes at a time; but if he were to work at no other rate, he would do very little work in a day. Various singular investigations have been made, both theoretically and experimentally, as to the most profitable rate of doing work, and their results are highly interesting. But to discuss them properly would require more space than we can afford. The table on preceding page, due to Poncelet, gives at least approximate notions of the horse power employed, and the whole work done, in a working-day, by men and animals variously applying their exertions.—See DYNAMICS, and its Cross-References.

WORK, *wĕrk*, HENRY CLAY: song-writer and inventor: 1832, Oct. 1—1884, June 8; b. Middletown, Conn.; son of Alanson W., who in 1841 was sentenced to several years' imprisonment in Mo. for aiding in the escape of fugitive slaves. While a child, W. removed to Ill. with his father. He received a common-school education, became a printer, and while working at his trade studied harmony. His war-songs first brought him into public notice; among them are *Marching through Georgia*, *Kingdom Coming*, and *Babylon is Fallen*. Of the many other songs that he wrote, *My Grandfather's Clock* and *Lily Dale* are best known. In 1865 he visited Europe, and in 1875 became connected, as composer, with the firm of Root & Cady. W. invented and patented a knitting-machine and a rotary engine. He died in Hartford, Conn.

WORK'HOUSE: a poor-house; an establishment in which paupers are lodged and supported at the expense of the parish or town. The name W. is restricted almost entirely to England and Ireland, *poor-house* being the term commonly used in Scotland and in the United States: see POOR—POOR LAWS.—The earliest mention of workhouses is in stat. 13 and 14 Car. II. c. 12, authorizing workhouses to be erected in the cities of London and Westminster, to which rogues and vagabonds might be committed by any two members of the 'Workhouse Corporation,' a Board created by the act, with the view of restraining them from predatory habits, and compelling them to work for their living. The provisions of this act were carried into effect in the reign of William and Mary, when a corporation, headed by the lord mayor of London, fitted up a house in Bishopsgate street as a workhouse, one part of which, called the Keeper's Side, was devoted to the purpose contemplated by the act of Charles II.—viz., the reception of vagrants and disorderly persons, committed by two governors; while in the other part, called the Steward's Side, poor children were lodged, and taught various employments and branches of education. A very few workhouses were afterward erected by local acts; but their

general adoption throughout England was provided for first by act 9 Geo. I. c. 7, by which the church-wardens and overseers of the poor in any parish or town were empowered, with consent of the majority of the inhabitants, to establish a workhouse, where the poor were to be lodged and maintained. Two or more parishes might unite in having one workhouse, and one parish might contract for the maintenance of its poor in the workhouse of another. Under this statute, buildings began to be erected and hired all over the country, with great zeal, for workhouses, in which all the poor were housed, industrious and profligate alike. Outdoor relief, which had been prohibited by the above statute, was reintroduced by 36 Geo. III. c. 23, and before long became the rule under a variety of systems, by which assistance was carried so far as to become a bounty on indolence. The poor-rates rose immensely, and it became the subject of general complaint that the able-bodied outdoor pauper had a degree of comfort which destroyed all stimulus to exertion. The result was the passing of statute 4 and 5 Will. IV. c. 76, which remodelled the whole administration of the poor-law, and greatly extended the workhouse system in England. The various workhouse officers, including master, matron, schoolmaster, schoolmistress, nurse, porter, and superintendent of outdoor labor, all have their proper functions assigned them. Persons having an order, either from the board of guardians, the relieving officers, or the overseers, are at all times entitled to admission; and in cases of necessity. applicants must be admitted without an order. If the house be full, the master is bound to refer the applicant to the relieving officer, whose duty it is to find him relief elsewhere. Casual poor wayfarers, admitted by the master or matron, are to be kept in a separate ward. By enactments regulating the discipline of workhouses, refusal to work at any suitable employment, intoxication, or other misconduct, is punished with imprisonment and hard labor, not exceeding 41 days. The usual rule, in accordance with which husband and wife are separated, is relaxed when they are above 60 years of age. Persons professing to be wayfarers or wanderers are to be searched on admission, and any money found on their persons is to be applied to the common fund of the union; and an applicant for relief concealing such money is to be punished as a disorderly person. In every workhouse a register is to be kept of young persons under 16 years of age who are hired as servants or bound apprentices; and the relieving officer is bound to visit them twice a year, and inquire into their food and treatment. A register of religious creeds is to be kept in every workhouse.

A workhouse of ordinary dimensions accommodates

450 to 700 inmates of both sexes and different ages; others, in populous neighborhoods, accommodate 1,500 inmates. Classification as regards sex and age is important, and is usually well attended to. In some situations the able-bodied inmates work at field-labor within boundary walls. There is no going in and out at pleasure. A workhouse is a sort of prison, under stern though not unkind discipline, and the leading principle always held in view is, that the offer of being accommodated shall act as a terror to idly disposed persons who are inclined to seek parish relief. The establishment of a workhouse really has this salutary effect; where there is no workhouse, the pressure on the poor-rates is generally excessive. A half-empty workhouse is thought a proof of good poor law management.

WORKING-PARTY: body of soldiers detailed or told off for some particular work or labor foreign to their ordinary duties.

WORKINGTON, *werk'ing-ton:* market-town and seaport of Cumberland, England; on the s. bank of the Derwent, about a mile from its mouth; 7 m. n. of Whitehaven, 311 m. from London by rail. Its harbor, furnished with breakwater and quays, is safe and commodious. To the coal mines in the vicinity the town chiefly owes its prosperity, great quantities of coal being exported; but also iron-foundries, malt-kilns, flour mills, ship-building yards, rope and sail cloth factories, breweries, and chemical works are in operation. A Sheffield steel-foundry (capacity 3,000 tons of steel per week) was transferred hither 1883, on account of the cost of transit to the seaside. Pop. (1901) 26,143.

WORKS, Board of: board for the management and control of public works and buildings; specifically, the board established in the United Kingdom for that purpose, whose expenses are defrayed from the crown revenues or parliamentary grants. It is more fully styled the Board of Works and Public Buildings; and is composed of a first commissioner, who is a political officer and sometimes has a seat in the cabinet; together with the secretaries of state; and the president and vice-president of the Board of Trade, who are *ex-officio* commissioners. The Board of Works has also the management of the parks in the metropolis, and of Richmond, Greenwich, Bushy, Phœnix, and Holyrood parks, and the public gardens at Kensington, Kew, and Hampton Court. Among the duties of the board are the providing of public walks, and access to the national buildings and collections. It is charged also with many arrangements and responsibilities connected with the making of new streets and roads, in London and elsewhere, and the erection and repair of public statues. The Board of Works is under control of the treasury, to whose sanction all large esti-

THE WORLD
ON MERCATOR'S PROJECTION
United States Possessions in Red
ARCTIC OCEAN
ATLANTIC OCEAN
PACIFIC OCEAN
INDIAN OCEAN
ANTARCTIC OCEAN
NORTH AMERICA
SOUTH AMERICA
EUROPE
ASIA
AFRICA
AUSTRALIA
RUSSIAN EMPIRE
CHINESE EMPIRE
EQUATOR
TROPIC OF CANCER
TROPIC OF CAPRICORN
ARCTIC CIRCLE
90° Longitude 110° East 130° from 150° Greenwich 170° 180° 170° 150° Longitude 130° West 110° from 90° Greenwich 70° 50° 30° 10° 0° 10° Longitude 30° East 50° from 70° Greenwich 90°

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mates for public works must be submitted. The treasury appoint the secretary, clerks, and other officers of the establishment; and with the sanction of the treasury, the commissioners appoint or employ such architects, surveyors, etc., as may be necessary.

WORKSHOP REGULATION ACT, in England, 1867. See FACTORY ACTS.

WORKSOP, *wėrk'sop* (anciently *wirkensop*): town of Nottinghamshire, England, 24 m. n. of Nottingham, 16 m. e.s.e. of Sheffield, 146 m. from London; on the right bank of the Ryton, a branch of the Idle, and near the Chesterfield canal, which communicates with the Trent. It is near the n. extremity of Sherwood Forest. The town is generally well built. There is a fine old church in Norman style, with two lofty towers. Worksop was formerly noted for its Augustine monastery, of which there are now few remains. Much barley is grown in the neighborhood, and malting is extensive. The manufactures of Worksop include agricultural implements, mill machinery, flour, lumber, chemicals, and iron and brass foundry products, etc. Worksop is a station on the Manchester, Sheffield and Lincolnshire railway. Pop. (1901) 16,112.

WORLD, n. *wėrld* [AS. *weorold, worold, world;* Dut. *wereld;* Fris. *warl,* the world: Icel. *veröld,* the universe, the age or life of man—from *verr,* a man, and *öld,* age, lifetime: Goth. *vair;* AS. *wer;* L. *vir,* a man: OHG, *weralt,* the age of man]: the globe or planet on which we live; any celestial orb considered as the scene of interests analogous to those of mankind; the earth; the present state of existence; the enjoyments and cares of the present life; course of life; customs and practices of men; people in general; the public; mankind, or some particular section of mankind, as, the heathen *world;* everything contained in the world; a large and more or less definite division of the globe, as the new *world;* the whole human race; the ungodly; a great number or quantity; very much or a great deal, as a '*world* of good'; time, as '*world* without end.' WORLD'LY, a. *-lĭ,* relating to this life; devoted to this life and its enjoyments; having no thought for the future; bent on gain; sordid; vile: AD. after the fashion of the world; with relation to this life. WORLD'LINESS, n. *-lĭ-nĕs,* the quality of being addicted to gain and temporal enjoyments. WORLD'LING, n. one devoted to the world and its pleasure. WORLD'LY-MINDED, a. devoted to gain and the pleasures of this life, and regardless of the future. WORLD'LY-MINDEDNESS, n. the state or quality of being engrossed with the gains and pleasures of this life. WORLD'WIDE, a. wide as the world. WORLD-ENGLISH, n. name given by Melville Bell to a new phonetic system of spelling the English language so as to render its acquirement by foreigners more easy, and to make it available for international use. ALL

THE WORLD, everybody; everything. ALL THE WORLD AND HIS WIFE, everybody, especially everybody of consequence. FOR ALL THE WORLD, for any consideration whatever; exactly. IN THE WORLD, in possibility. NEW WORLD, the continent of America, as distinguished from Europe, Asia, and Africa, which are called the *old world*. TO GO TO THE WORLD, to be married; hence, in Shak., 'a woman of the world' is a married woman.

WORLD, THE: a study of the earth and its construction will easily give ground for the opinion that the globe was prepared expressly for the habitation and home of mankind. In fact, it is quite probable that men have inhabited almost every land since one of the very early epochs, for science has unearthed the bones, the weapons, and the industrial tools of races that must have existed ages upon ages before the first chapter of history was written. Their habitations were of the crudest kind, it is true—caves and trees, or mud huts being their most common abode—and yet, while they were generally as uncultured and barbarous as some of our very savage tribes are to-day, some of them developed, under the influence of a good climate and favorable natural conditions, to the point where they were able to form a high ideal of home, the family, and a divine being. One race lived near the Hindoo Koosh Mountains, and its people are called the Aryan race. Another, which started in the valley of the Tigris and Euphrates, are called the Semitic race. 'The Aryan race had a genius for law,' said Miss Hopkins, in her *Handbook of the Earth,* 'the Semitic race had a genius for religion, and when the two races met at the time of Christ the two ideas grew together and produced Christian civilization. The Aryan race spread all over Europe, and thence over nearly the whole earth. The Semitic race remained more stationary, and have never gone far from the southwestern part of Asia, which has been called the cradle of civilization, or the cradle of the human race, because both these great races had their origin there.' Both the Hebrews and the Arabs came of the Semitic race, and all the religions based upon the idea of one God are of Semitic origin.

The more savage races were originally called Turanian, meaning 'dark,' and as Aryan means 'light,' it is probable that the two terms referred to the complexion of the races, or the color of the skin. If this was once true, however, it does not apply so correctly at the present time, for, during the centuries that have passed since their origin, the Aryan race has modified its color, just as it has its habits and its language, so that now there are dark and swarthy Aryans, just as there are those of a lighter type. Statistically, the races are divided as follows:

ARYAN.

Persian.	*Slavonic.*	*Romantic.*
Hindoos.	Russians.	French.
Germanic.	Poles.	Italians.
German.	Hungarians.	Spaniards.
English.		Portuguese.
Danes.	*Celts.*	Greek.
Norwegian.	Irish.	
Swedes.	Welsh.	
Dutch.	Scotch.	

SEMITIC.

Arabs.
Syrians.
Hebrews.

Physical Divisions of Men.—The present physical divisions of men divide the human race into five distinct classes: (1) the Caucasian, or white race; (2) the Mongolian, or yellow race; (3) the Malay, or brown race; (4) the Indian, or red race, and (5) the Negro, or black race. These divisions are based upon the features, quality of hair, shape of skull, and color of skin. Thus, the Caucasians are supposed to possess either pinkish white, or dusky skins, with light or dark but silky hair, and finely modeled features. The Mongolians have yellow skins, with small black eyes, somewhat obliquely set, coarse black hair and scanty beards, high cheek bones, and receding forehead. By some authorities the Malay, or brown race, is regarded as a portion of the Mongolian race, but by others it is held as a distinct class. Its members have browner, or more swarthy, skins than the Mongolians, but their features are very similar. The Indian, or red race, have brown skins, with very high cheek bones, and straight black hair, while the Negroes have black woolly hair. Like the Malays, the skin of the Negro varies in color from a light brown hue to an absolute black. In addition to the generally kinky hair, their distinguishing features are protruding lips and flat noses.

Intellectual Divisions of Men.—Intellectually the human race is divided into four classes: (1) savages; (2) barbarians; (3) half-civilized, and (4) civilized races. The savages are little better than animals in their mode of living. They still live in caves, or in the rudest kind of dwellings. They have no written language; they make no laws, and know no higher rule than that of force; they wear but little clothing, and are addicted to the most degrading habits. Barbarians are a trifle more civilized than the savages. They have a faint idea of law and they practice some of the crude arts, such as the manufacture of pottery and metal-ware. The so-called half-civilized races are a grade more intelligent. They can read and write; they make laws and enforce them; they build cities, and make useful articles for sale, and yet they are addicted to degrading customs

and many barbarous characteristics. The civilized races, of course, are those that have attained the highest degree of advancement, and who make use of all the modern inventions in their ordinary life, as well as in their intercourse with other nations. The best and most enlightened governments are also those of the civilized races.

Governments.—The first ties by which men were ever bound were undoubtedly those of the family, and, as was but natural, the family finally commenced to assume some of the characteristics of a government, with the father as ruler. Thus, in course of time, the families formed into groups; the groups into tribes, then into communities, or towns, and, by direct succession, into states, and nations. There are savage tribes that still recognize the parental rule; there are others over which chiefs still rule, practically without laws, as despots; but, in every case, the development of civilization has brought a corresponding improvement in the conditions of government.

The governments of the civilized world may be divided into three classes: (1) absolute monarchies; (2) limited, or constitutional monarchies, and (3) republics. The first actual government adopted by a barbarous nation is always an absolute monarchy, or a government in which the power of both making and enforcing the laws rests solely in the hands of the ruler. As the people develop greater intelligence, however, the desire to partake somewhat in the privileges of government takes possession of them, and they begin to see the wisdom of restraining their ruler in the exercise of his absolute power. It is at such a time that they insist upon the adoption of a constitution to which both they and their ruler shall be subject, and, so the absolute monarchy, or the government under a despot, becomes a limited, or constitutional monarchy.

The next step in the assumption of power on the part of the people is seen in the republic, a form of government in which the ruler is chosen by the people, and the laws are made and enforced by men selected for that purpose by the people. The chief ruler of a republic is called a 'president'; the ruler of a monarchy may be a prince, a grand duke, a king, emperor, kaiser, czar, sultan, shah, khedive, etc. A country ruled by a prince is called a principality; if ruled by a duke, a duchy; by a king, or queen, a kingdom, while an empire is a number of states, or kingdoms, under one chief ruler. Most monarchies are hereditary, and descend from father to son, although there are some countries in which the ruler is chosen by electors; in others the hereditary line may pass to the female side of the house, while, in Turkey, for example, it is the next oldest male relative, and not the eldest son, who inherits.

All the land that is under one government is known

as a 'country'; the people who are under one government constitute what is known as a 'nation.' For purposes of government, countries are divided into various kinds of divisions—departments, provinces, states, territories, counties, cities, towns, etc. These are known as the 'political divisions' of the country. The following table shows the size, population, and form of government of the principal countries of the world:

SIZE, POPULATION AND GOVERNMENT OF COUNTRIES.

Country.	Area, Sq. M.	Estimated Population.	Character of Government.
Abyssinia	150,000	3,500,000	Absolute monarchy.
Afghanistan	215,400	4,000,000	Absolute monarchy.
Andona	175	6,000	Republic under suzerainty of France and the Bishop of Urgel.
Annam	52,100	6,124,000	French protectorate.
Argentine Republic	215,400	4,000,000	Republic.
Austria	115,903	26,150,708	Constitutional monarchy.
Baluchistan	132,315	1,049,800	British protectorate.
Belgium	11,373	6,693,500	Constitutional monarchy.
Bhutan	20,000	250,000	Independent State, under both secular and spiritual heads.
Bokhara	92,300	1,250,000	Russian dependency.
Bolivia	933,982	1,332,600	Republic.
Brazil	3,218,130	14,333,900	Republic.
Brunei	15,000	45,000	British protection.
Bulgaria	37,860	3,744,280	Turkish Tributary State.
Cambodia	37,400	1,103,000	French protectorate.
Chili	279,901	2,713,000	Republic.
China	4,277,170	426,047,300	Absolute monarchy.
Columbia	475,000	3,750,000	Republic.
Congo Ind. States	900,000	30,000,000	Independent State under King of the Belgians.
Costa Rica	18,400	243,200	Republic.
Crete	2,950	301,600	Autonomous State under suzerainty of Turkey.
Cuba	36,000	1,750,000	Republic.
Denmark	15,360	2,464,700	Constitutional monarchy.
Dominican Republic	18,045	610,000	Republic.
Ecuador	116,000	1,400,000	Republic.
Egypt	400,000	10,000,000	Turkish dependency with English financial adviser.
France	207,054	39,000,000	Republic.
German Empire	208,830	56,368,000	Constitutional monarchy.
Prussia	134,603	34,472,500	Constitutional monarchy.
Bavaria	29,282	6,176,057	Constitutional monarchy.
Saxony	5,787	4,202,216	Constitutional monarchy.
Wurtemburg	7,528	2,169,480	Constitutional monarchy.
Baden	5,821	1,376,944	Constitutional monarchy.
Hesse	2,965	1,119,393	Constitutional monarchy.
Anhalt	906	316,085	Constitutional monarchy.
Brunswick	1,424	464,333	Constitutional monarchy.
Mecklenburg-Schwerin	5,135	607,770	Constitutional monarchy.
Mecklenburg-Strelitz	1,131	102,602	Constitutional monarchy.
Oldenburg	2,479	399,180	Constitutional monarchy.
Saxe-Coburg & Gotha.	755	229,550	Constitutional monarchy.
Waldeck	433	57,918	Constitutional monarchy.
Saxe-Altenburg	511	194,914	Constitutional monarchy.
Saxe-Weimar	1,388	362,873	Constitutional monarchy.
Saxe-Meiningen	953	250,731	Constitutional monarchy.
Lippe	469	138,952	Constitutional monarchy.
Schwarzburg-Sond.	333	80,898	Constitutional monarchy.
Schwarzburg-Rud.	363	93,059	Constitutional monarchy.
Schaumburg-Lippe	131	43,132	Constitutional monarchy.
Reuss, Sr.	122	68,396	Constitutional monarchy.
Reuss, Jr.	319	139,210	Constitutional monarchy.
Alsace-Lorraine	5,600	1,719,470	Provincial governor.
Great Britain & Ireland	120,979	41,952,510	Constitutional monarchy.
Greece	25,014	2,433,806	Constitutional monarchy.
Guatemala	48,290	1,574,360	Republic.
Haiti	10,204	1,294,400	Republic.
Honduras	46,250	587,500	Republic.
Hungary	125,430	19,122,350	Constitutional monarchy.
Iceland	39,757	78,750	Danish province.
India	1,087,404	232,000,000	Empire under the sovereignty of King of England.

Country.	Area, Sq. M.	Estimated Population.	Character of Government.
Italy	110,550	32,476,000	Constitutional monarchy.
Japan	147,655	44,260,600	Constitutional monarchy.
Johore	9,000	200,000	British protectorate.
Khiva	22,320	800,000	Russian vassal state.
Korea	82,000	14,000,000	Absolute monarchy.
Liberia	35,000	2,060,000	Republic.
Liechtenstein	65	10,000	Constitutional monarchy.
Luxemburg	998	237,000	Constitutional monarchy.
Mexico	767,005	13,600,000	Republic.
Monaco	8	15,200	Absolute monarchy.
Montenegro	3,630	228,000	Absolute monarchy.
Morocco	219,000	5,000,000	Absolute monarchy.
Nepal	50,000	4,000,000	Military oligarchy.
Netherlands (The)	12,648	5,300,000	Constitutional monarchy.
Nicaragua	49,200	380,000	Republic.
Norway	124,130	2,240,000	Constitutional monarchy.
Oman	82,000	1,500,000	Absolute monarchy.
Panama	31,570	275,700	Republic.
Paraguay	157,000	531,000	Republic.
Persia	628,000	9,500,000	Absolute monarchy.
Peru	695,733	4,610,000	Republic.
Portugal	36,038	5,429,000	Constitutional monarchy.
Roumania	50,720	5,914,000	Constitutional monarchy.
Russia	8,660,395	142,000,000	Absolute monarchy.
Salvador	7,225	1,007,000	Republic.
San Marino	38	11,000	Republic.
Sarawak	50,000	600,000	British protectorate.
Servia	18,630	2,494,000	Constitutional monarchy.
Siam	236,000	5,000,000	Absolute monarchy.
Spain	190,050	19,000,000	Constitutional monarchy.
Sweden	172,876	5,176,000	Constitutional monarchy.
Switzerland	15,976	3,316,000	Republic.
Tonga	390	19,000	British protectorate.
Tonquin	46,400	7,000,000	French dependency.
Tripoli	400,000	1,000,000	Turkish vilayet.
Tunis	51,000	1,900,000	French dependency
Turkey	1,115,046	25,000,000	Constitutional monarchy.
Nyanda	80,000	4,000,000	British protectorate.
United States of America	3,692,125	76,303,387	Republic.
Uruguay	72,210	964,600	Republic.
Venezuela	593,943	2,324,000	Republic.
Witu	1,200	15,000	British protectorate.
Zanzibar	1,020	200,000	British protectorate.

Colonial Divisions.—In addition to the ordinary political divisions, nearly all of the prominent nations exercise a certain amount of control over countries in distant portions of the globe. Some of these they possess outright, by means of conquest, or by treaty right. These are known as 'colonies,' or 'possessions.' Over others they merely exercise a specified degree of government, in which case they are called 'dependencies,' or 'protectorates.' The British colonies present a good example of the characteristics of colonial government, as they constitute three distinct classes: (1) the Crown Colonies, which are entirely under the control of the British government; (2) those possessing Representative Institutions, in which the crown has no more than a veto on legislation, and the home government retains control of public offices; and (3) those possessing a responsible government, in which the crown merely appoints a governor, and retains a veto on legislation. Thus, many of the countries, which are actually under the protection and control of some one of the great nations still maintain their own sovereign and make their own laws, subject merely to a superficial government by the protecting power, except under extreme conditions, when the right of veto may be exercised.

WORLD.

The following table shows the area and population of the colonial divisions of the world, as well as the form of government to which each colony is subject:

COLONIAL DIVISIONS OF THE WORLD.

AFRICA.

Colony.	Area, Sq. M.	Estimated Population.	Form of Government.
Algeria	184,474	4,740,000	French colony.
Algerian Sahara	123,500	50,000	French possession.
Angola	484,800	4,120,000	Portuguese possession.
Ascension	35	430	British crown colony.
Azores and Madeira Is.	1,510	407,000	Portuguese province.
Basutoland	10,293	264,100	British crown colony.
Bechuanaland	286,200	101,000	British protectorate.
British East Africa	1,000,000	2,500,000	British protectorate.
British Central Africa.	42,217	901,000	British protectorate.
British South Africa (Rhodesia)	425,728	1,075,000	British protectorate.
Canary Islands	2,808	335,000	Spanish province.
Cape Colony	276,775	2,433,000	British protectorate.
Cape Verde Islands	1,480	148,000	Portuguese province.
Ceuta	13	5,100	Spanish province.
Comoro Islands	620	47,000	French protectorate.
Congo Independent States	900,000	30,000,000	Belgian protectorate.
Dahomey	60,000	1,000,000	French possession.
Egypt	400,000	10,000,000	Turkish tributary state.
Eritrea, etc	42,000	330,000	Italian possession.
Fernando Po, etc	850	24,000	Spanish possession.
French Congo	1,160,000	10,000,000	French possession.
Gambia	69	13,500	British crown colony.
German East Africa	384,180	8,000,000	German protectorate.
German South West Africa	322,450	200,000	German protectorate.
Gold Coast	40,000	1,500,000	British crown colony.
Guinea, French	95,000	2,200,000	French possession.
Guinea, Portuguese	4,400	820,000	Portuguese possession.
Ivory Coast	116,000	2,000,000	French possession.
Kamerun	191,131	3,500,000	German protectorate.
Lagos	3,460	86,000	British crown colony.
Madagascar	227,950	2,506,000	French possession.
Mauritius, etc	729	379,000	British crown colony.
Mayotte	140	11,640	French possession.
Military Territory	700,000	4,000,000	French possession.
Natal and Zululand	34,019	903,000	British suzerainty.
Nigeria	400,000	25,000,000	British protectorate.
Nossi-Be	130	10,000	French possession.
Orange River	48,350	207,500	British possession.
Portuguese East Africa.	301,000	3,120,000	Portuguese possession.
Princes and St. Thomas Islands	360	43,000	Portuguese possession.
Reunion	966	173,200	French possession.
Rio-de-Oro and Adrar	243,000	100,000	Spanish possession.
Sahara	1,544,000	2,600,000	French possession.
St. Helena	47	3,350	British crown colony.
St. Marie	64	7,750	French possession.
Senegal	80,000	1,800,000	French possession.
Seychelles	148	20,000	British crown colony.
Sierra Leone	4,000	77,000	British crown colony.
Somali Coast	75,000	.....	British protectorate.
Somali Coast	45,000	200,000	French possessions.
Somali Coast	100,000	400,000	Italian possessions.
Togoland	33,700	900,000	German protectorate.
Transvaal	119,140	1,100,000	British possession.
Tripoli	398,000	800,000	Turkish tributary state.
Tristan da Cunha	45	100	British crown colony.
Tunis	51,000	1,900,000	French protectorate.
Uganda	140,000	3,000,000	British protectorate.
Zanzibar and Pemba	1,020	200,000	British protectorate.

ASIA.

Colony.	Area, Sq. M.	Estimated Population.	Form of Government.
Aden and Perim	80	41,250	British crown colony.
Annam	52,100	6,125,000	French protectorate.
Bahrein Islands	273	68,000	British protectorate.
Baluchistan	130,000	500,000	British protectorate.
Bokhara	92,000	1,250,000	Russian dependency.
Cambodia	37,400	1,500,000	French protectorate.

WORLD.

Colony.	Area, Sq. M.	Estimated Population.	Form of Government.
Ceylon	25,365	3,579,000	British suzerainty.
Cochin-China	22,000	3,000,000	French possession.
Cypress	3,584	228,000	British administration.
East Turkestan	550,340	1,200,000	Chinese dependency.
Formosa	13,455	2,750,000	Japanese dependency.
French India	196	273,000	French possession.
Goa	1,390	495,000	Portuguese possession.
Hong-Kong	407	385,000	British crown colony.
India, British	1,087,404	231,898,807	British crown colony.
Jungaria	147,950	600,000	Chinese dependency.
Kianchau Bay	200	60,000	German possession.
Khiva	22,320	800,000	Russian dependency.
Kwang Tung	.....	.....	Russian possession.
Macao	4	78,750	Portuguese possession.
Malay States	27,500	525,000	British protectorate.
Manchuria	363,610	8,500,000	Chinese dependency.
Mongolia	1,367,600	2,580,000	Chinese dependency.
Pescadores Islands	85	52,500	Japanese dependency.
Portuguese India	1,558	572,290	Portuguese possession.
Sam a	180	55,000	Turkish tributary.
Sikkim	2,818	30,460	British protectorate.
Straits Settlement	1,472	575,000	British crown colony.
Thibet	463,200	6,430,000	Chinese dependency.
Tonquin and Laos	144,400	7,759,000	French possessions.

EUROPE.

Colony.	Area, Sq. M.	Estimated Population.	Form of Government.
Bosnia and Herzegovina	23,262	1,600,000	Austro-Hungarian protectorate.
Bulgaria and E. Roumelia	38,080	3,750,000	Turkish tributary state.
Crete	3,326	375,000	Turkish suzerainty.
Finland	144,255	2,592,800	Russian province.
Faroe Islands	512	15,230	Danish colony.
Gibraltar	2	27,460	British crown colony.
Iceland	39,756	78,500	Danish province.
Malta and Gozo	117	188,200	British suzerainty.

NORTH AMERICA.

Colony.	Area, Sq. M.	Estimated Population.	Form of Government.
Alaska	599,446	63,592	United States territory.
Bahama	4,470	54,358	British institutions.
Barbados	166	195,600	British institutions.
Bermudas	20	17,600	British institutions.
Canada	3,048,710	5,371,315	British dependency.
Curacao, etc	403	52,350	Dutch possession.
Danish West Indies	138	32,800	Danish possession.
Greenland	46,740	11,000	Danish possession.
Guadeloupe, etc	688	182,200	French possession.
Honduras (British)	7,560	38,000	British crown colony.
Leeward Islands	700	127,500	British possession.
Jamaica and Turk's Is.	4,370	775,000	British crown colony.
Martinique	380	204,000	French possession.
Newfoundland and Labrador	162,200	217,200	British dependencies.
Porto Rico	3,606	951,000	United States possession.
St. Pierre and Miguelon	92	6,300	French possession.
Trinidad and Tolago	1,868	280,000	British crown colony.
Windward Islands	500	163,000	British possession.

SOUTH AMERICA.

Colony.	Area, Sq. M.	Estimated Population.	Form of Government.
Falkland Islands	7,500	2,076	British crown colony.
Guiana (British)	104,000	294,000	British possession.
Guiana (French)	30,500	33,000	French possession.
Guiana (Dutch)	46,060	69,000	Dutch possession.

OCEANIA.

Colony.	Area Sq. M.	Estimated Population.	Form of Government.
Bismarck Archipelago	0,00	188,000	
Borneo (British North)	31,106	175,000	German possession.
Borneo (Dutch)	212,737	1,181,000	British protectorate.

Colony.	Area, Sq. M.	Estimated Population.	Form of Government.
Caroline Is. and Palaos	810	42,000	Dutch possession.
Celebes Islands	71,470	1,198,000	German possession.
Fiji and Rotumah Is.	7,740	121,000	Dutch possession.
Guam	150	9,000	British crown colony.
Hawaii	6,449	154,000	United States possession.
Java and Madura	50,554	29,000,000	United States territory.
Kaiser Wilhelm Land	70,000	110,000	Dutch possession.
Marianne Islands	250	2,000	German protectorate.
Marquesas Islands	480	4,300	German possession.
Marshall Island	150	13,000	French possession.
New Caledonia	7,650	51,500	German possession.
New Guinea (British)	90,540	350,000	French possession. British crown colony.
New Guinea (Dutch)	195,653	600,000	British crown colony.
New South Wales	310,370	1,398,000	British dependency.
New Zealand	104,470	788,000	British dependency.
Philippine Islands	119,542	8,000,000	United States possession.
Queensland	668,500	511,000	British dependency.
Samoa: Savaii and Upola	111,000	29,200	German possession.
Samoa: Tutuila and Manua	79	5,900	United States possession.
Society Islands, etc.	1,520	29,000	French possession.
Solomon Islands	4,200	45,000	German possession.
South Australia	903,700	364,800	British dependency.
Sumatra	161,612	3,209,000	Dutch possession.
Tasmania	26,215	174,300	British dependency.
Timor (Dutch)	44,374	978,500	Dutch possession.
Timor (Portuguese)	7,458	300,000	Portuguese possession.
Victoria	87,890	1,208,750	British dependency.
West Australia	975,920	195,000	British dependency.

Climate.—Europe is almost entirely in the North Temperate zone, and yet, owing to its surface structure, as well as to the direction of its prevailing winds, its mean temperature is higher than that of other continents. The dry climates of eastern Europe are subject to great extremes of heat and cold in the western portion, and the moist atmosphere that is brought from the North Atlantic tends to modify the extremes of climate in the western part, just as the hot winds that blow up from the Sahara increase the warmth of the southern part. Russia is subjected to periods of great cold and heat, owing to the fact that it has practically no protection against the winds from Siberia and the Arctic Ocean.

Asia.—Asia stretches from the equator into the Arctic regions, and has almost every variety of climate. Its climatic conditions are also extreme, owing to the physical construction of the continent. Its lofty mountain ranges shut out any modifying winds that might blow from the ocean, while in the north its vast plains are open to the excessively cold winds from the polar circle. It is only along the eastern borders that the ocean winds have any great opportunity to exercise their modifying influence, a fact which explains the intense heat that prevails in the lower latitudes. Siberia is, of course, the coldest country; Arabia is the hottest.

Africa.—As Africa is largely within the Torrid zone, and embraces many deserts from which none but hot winds come, its heat in many places is almost unbearable. The elevation of the continent along the equator tends to modify the climate slightly, while the excessive rainfalls in central Africa also have a cooling effect.

North America.—Like Asia, North America extends from the Torrid zone to the Arctic circle, and so pos-

sesses a wide range of climatic conditions. The extreme northern portions are subject to excessive cold and to moderate degrees of heat during the summer months. The eastern portions have more regular seasons with abundant rainfalls, owing to the vapors that are constantly being brought from the Gulf of Mexico and the Atlantic Ocean. If the central divisions are more arid, because of their lack of a moist atmosphere, the Pacific slope is kept mild and moist by the moisture-laden winds of the Pacific Ocean. While the southern portion of the continent extends into the tropics, its excessive rains and the winds from the gulf and ocean modify its heat.

South America.—The continent of South America has two distinct climates, as the northern portion is in the tropics, while the southern part is in the Temperate zone. The heavy rains which prevail along the Atlantic slope are due to the easterly winds which predominate in that quarter. South of the La Plata the westerly winds blow from the Pacific Ocean, keeping that part of the continent moist and mild, but, north of that section, the land is more arid.

Oceanica.—As Oceanica is composed of innumerable islands dispersed over a vast expanse of ocean, it is next to impossible to classify them climatically. In general, however, their location subjects them to the moist winds from the oceans, so that, despite the arid conditions that may exist in the interior, their coasts are almost invariably fertile.

Commerce of Nations.—It was early in the history of the world that the people of the various nations found it convenient to exchange their products. Those who had more furs than they could use were eager to exchange them for food or clothing; those who raised sheep were glad to dispose of them for furs or fuel. Long before metal coins were used, articles of barter took the place of money, as they do now in some parts of the world.

It was in this manner that the commerce between nations had its beginning, and, since the improvement in our methods of transportation, it has steadily increased. Thus, the United States to-day produces about one-quarter of all the wheat that is raised in the world; about four-fifths of the corn; three-quarters of the cotton; two-fifths of the tobacco; one-third of the lumber; one-third of the coal and iron; one-quarter of the gold and silver; one-half of the hogs, etc. Not being able to make use of nearly all this vast production in this country, it disposes of its surplus articles by sending them to other nations, and taking, in return, the manufactured goods and luxuries that it does not produce in sufficient quantities here. It is by commerce, therefore, that the wants of the world are supplied. Commerce is of two kinds: (1) domestic commerce, and (2) foreign commerce. Domestic commerce is that which is carried on between

persons living in the same country. Foreign commerce is that which is carried on between persons in different countries. All articles of commerce are enumerated under two classifications: (1) raw materials, and (2) manufactured goods. Raw materials are those products that are procured from plants, animals, or minerals. Manufactured goods are those that are made by man. The goods that are brought into a country are known as 'imports.' The goods that are sent out of the country are called 'exports.'

Natural Resources and Material Interests.—The natural resources of a country are its agricultural products, its mineral wealth, its forests, and its fisheries. Its manufactures and the industries required in adapting its raw materials to the uses of man are known as its material interests. It is upon both of these classes of products that each country establishes its commercial relations with other nations of the world.

The following list shows the chief products of the principal countries of the world:

Afghanistan.—Base and precious metals; silks; felts; camel's hair; sheepskins; dyestuffs; carpets; assafœtida.

Argentine Republic.—Meat and hides; cereals; alfalfa; sugar cane; tobacco; cotton; peanuts; tallow; butter; base and precious metals.

Austria-Hungary.—Base and precious metals; grain; beetroot; wines; miscellaneous manufactures.

Belgium.—Base and precious metals; animals; wool; linen; flax; machinery.

Bolivia.—Coffee; sugar; rubber; cacao; chincona bark; common salt; base and precious metals.

Brazil.—Coffee; sugar; rubber; Paraquay tea; timber; cocoanuts; cattle; diamonds; base and precious metals.

Bulgaria.—Wheat and other agricultural products, and minerals.

Chili.—Minerals, including vast quantities of nitrate and copper; sugar; wines; fruits; cereals; hides; wool.

China.—Tea; silk; rice and other cereals; vegetables; coal, and other minerals.

Colombia.—Coffee; cocoa; tobacco; sugar; vegetable ivory; dye-woods; bananas; rubber; cereals; salt; emeralds; base and precious metals.

Costa Rica.—Coffee; bananas; rice; cocoa; rare woods; minerals.

Cuba.—Tobacco; fruits; vegetables; woods; dye-woods; gums; fibres; oils; resins; minerals.

Denmark.—Horses; cattle; sheep; goats; grain; vegetables; fodder; seeds; beet-sugar; fish.

Dominican Republic.—Coffee; cacao; tobacco; fruits; cocoanuts; sugar; rum; timber.

Ecuador.—Cotton; tobacco; dye-woods; timber; cacao; sugar; nuts; fruits; vegetables; base and precious metals.

Egypt.—Sugar; rice; cotton; grains; vegetables; animals; skins; leather; oils; dyestuffs.

France.—Wines; grain; vegetables; beet-root sugar; olives; mulberry leaves; silks, and other textiles; manufactures; minerals; fish.

Germany.—Textiles; animals, and animal products; wines; machinery; hardware; metals, and metal-ware; paper goods; fuel; wooden-ware; sugar; dyes.

Great Britain.—Textiles; animals, and animal products; grain; vegetables; hops; fruit; fish; minerals, and base and precious metals.

Greece.—Fruits; olives; wines; cereals; cotton; tobacco.

Guatemala.—Coffee; tobacco; sugar; rubber; fruit; salt; minerals.

Haiti.—Coffee; cacao; tobacco; sugar; cattle; minerals.

Honduras.—Tobacco; sugar; grain; cocoanuts; sarsaparilla; coffee; rice; indigo; fruit; cattle; minerals.

Italy.—Wines; fruit; tobacco; olive oil; rice; grain; silk; sugar; timber.

Japan.—Rice; grain; tea; sugar; silk; cotton, and other textiles; porcelains; metal-ware.

Korea.—Rice; ginseng; base and precious metals.

Mexico.—Animals, and animal products; coffee; tobacco; woods, and dye-woods; henequen; base and precious metals.

Montenegro.—Tobacco; grain; vegetables; wine; animals.

Morocco.—Goat-skins; almonds; wool; vegetables; eggs; wax; cattle; grain.

Netherlands (The).—Cereals and flour; mineral oils; indigo; saltpetre; tallow; coffee; minerals.

Nicaragua.—Coffee; bananas; rubber; sugar; tobacco; minerals; manufactures.

Panama.—Coffee; tobacco; sugar; rubber; minerals.

Paraguay.—Cattle; Paraguay tea; tobacco; timber; fruit; grain; vegetables.

Persia.—Silk; grain; pearls; minerals.

Peru.—Cotton; coffee; sugar; cocoa; rice; tobacco; grain; rubber; cinchona; dyes, and medicinal plants; hides; wool; minerals; manufactures.

Portugal.—Fruits; wines; textiles; fish.

Roumania.—Cereals; fruit; fuel; chemicals; timber.

Russia.—Cereals; textile manufactures; timber; wines; tobacco; cotton; rice; silk; vegetables; base and precious metals.

Salvador.—Coffee; rubber; tobacco; indigo; sugar; minerals.

Servia.—Plums; plum marmalade; tobacco; wines: silk; cotton; cattle; minerals.

Siam.—Rice; teak; diamonds; base and precious metals.

Spain.—Wines; silk; fruit; olives; nuts; grain; fish; base and precious metals.

Norway.—Agricultural produce; cereals; animals; timber; minerals; fish.

Sweden.—Agricultural produce; cereals; cattle; timber; fish.

Switzerland.—Agricultural produce; grain; vegetables; wine.

Turkey.—Coffee; opium; gums; madder; silk; wines; perfumes; brass and copper ware; tapestry; chrome pigments; pearls; fish; minerals.

United States.—Agricultural produce; grain; cotton; tobacco; vegetables; cattle; hogs; timber; base and precious metals; fruit; fish; manufactures of all kinds.

Uruguay.—Grain; vegetables; tobacco; olives; cattle; sheep; hogs; minerals.

Venezuela.—Sugar; coffee; cereals; cocoa; fruits; nuts; rubber; hides; skins; base and precious metals.

Religions of the World.—Religions are divided into two classes: (1) monotheistic, and (2) polytheistic. Monotheism is a belief in one God; polytheism, a belief in many gods. Christianity, Judaism, and Mohammedanism are all monotheistic. Brahmanism, Buddhism, and other pagan religions are polytheistic. According to the best authorities the people of the world are divided as follows regarding their religious belief: Brahmanists and Buddhists, 650,000,000; Pagans, etc., 220,000,000; Mohammedans, 200,000,000; Roman Catholics, 194,000,000; Protestants, 88,000,000; Greek Church, 80,000,000; Jews, 6,655,400.

WORLIDGE, *werl'ij* (or WOOLRIDGE), JOHN: one of the earliest British writers on agriculture and gardening: b. England. He published several works, of which the most important was *Systema Agriculturæ; the Mystery of Husbandry Discovered and Laid Open* (1669, folio, pp. 326—several editions; 8vo 1716). Worlidge favored the inclosure of waste lands; mixing of different kinds of soils; deep plowing; sowing seed in drills; changing seed 'from dry, hungry, barren land, to rich and fat land'; liberal use of manures; planting of timber and fruit trees; and other improvements on the methods of his time. Among his works were: *Systema Horticulturæ; or the Art of Gardening* (1677); and *The Most Easy Way of Making Cyder* (1678).

WORM, n. *wėrm* [AS. *wyrm;* Dut. *worm;* Dan. and Sw. *orm;* Goth. *vaurms;* Ger. *wurm;* L. *vermis,* a worm: Lith. *kirmis;* Skr. *krimi,* a worm: Ir. *cruimh,* a maggot]: any long, small, creeping animal entirely without feet, or with very short ones; one of the long, string-like creatures whose body consists of a number of movable rings or joints, and which live in the earth or breed in the intestines, and of which there are many species (see WORMS, or VERMES); a grub; a maggot; *figuratively,* anything that gnaws or torments internally or one's conscience; a

thing debased and despised; anything spiral or thread-like, as the thread of a screw; in a *still*, the coil of pipe through which the vapor or spirit runs and is condensed (see DISTILLATION; STILL); a small worm-like cartilage in the tongue of a dog; in *OE.*, a snake or serpent: V. to move like a worm; wriggle; to work gradually and secretly; to undermine or expel by slow and secret means; to cut the worm-like cartilage in the tongue of a dog. WORM'ING, imp. WORMED, pp. *wėrmd.* WORMY, a. *wėrm'ĭ*, relating to or abounding with worms. WORM'-LIKE, a. *-līk*, resembling a worm. WORM'-EATEN, a. gnawed or pierced by worms; old; worthless. WORM'-POWDER, a medicine for expelling worms from the intestines. WORM'-SHAPED, a. in *bot.*, more or less cylindrical and contorted. WORM'-WHEEL, a wheel having teeth formed to fit into the spiral spaces of a screw, so that the wheel may be turned by the screw. TO WORM ONE'S SELF INTO, to enter gradually by arts and insinuations.

WORM-EATING WARBLER: a small, ground-keeping warbler of the United States (*Helmitheros vermivorus*), breeding commonly in the woods of the eastern part, and migrating in winter to Central America. It is 5½ in. long, olive-green above, yellowish-white below, the distinguishing specific mark being three black stripes on the buffy crown. Its song is a faint thrill, heard most often in hilly woodlands, where the bird hunts for caterpillars and similar food among the lower branches of the bushes or upon the ground. Its nest is constructed with great skill in some little natural cavity of a hillside, and is cleverly hidden under an arch of twigs and old leaves, so disposed as to well conceal the white, red-speckled eggs. The mother uses the trick common to so many ground-building birds, of feigning lameness, fluttering ahead of the intruder in a frantic attempt to draw him away from the nesting-place in vain pursuit of herself.

WORM FEVER: popular name for the disease formerly described as *infantile remittent fever*, but now known to be typhoid fever in young children.

WORMELEY, *wėrm'lĭ*, KATHARINE PRESCOTT: American author and translator: b. Ipswich, England, 1830, Jan. 14; d. 1908, Aug. 4. She was the daughter of an English rear admiral and a niece of Commodore Edward Preble of the American navy, and came to the United States in girlhood. She was engaged in the relief of Union soldiers during the civil war and was connected with the United States Sanitary Commission. She was most widely known as a translator of Honoré de Balzac's novels in 40 volumes (1883-97); of Molière in 6 volumes (1892); and of the Duc de Saint-Simon's *Memoirs* (1898-1901); and was the author of *Letters from Headquarters During the Peninsular Campaign* (1862); *The Other Side of War* (1888); *Life of Balzac; The United States Sanitary Commission* (1863).

WORM'-GRASS. See SPIGELIA.

WORMS, *vorms:* ancient and interesting but decayed town of Hesse-Darmstadt; in a highly fruitful district on the left bank of the Rhine, 20 m. s.e. of the town of Darmstadt; 20 m. n.w. of Heidelberg, and communicating with Mainz and Mannheim by railway. Among its churches, the chief is the cathedral, a massive building in the Byzantine style, with four towers, founded in the 8th, completed in the 12th century. On a hill near the church called the Liebfrauenkirche, a highly esteemed wine, called *Liebfrauenmilch*, is grown. The manufacture of polished leather employs 1,200 hands; tobacco is manufactured, and a trade in the wines and the agricultural produce of the vicinity is carried on. Worms is one of the oldest cities of Germany, and is the scene of the *Nibelungen-Lied*. It was occupied by the Romans, destroyed by Attila, and rebuilt by Clovis. It was frequently the residence of Charlemagne and his Carlovingian successors, was the place of convocation of many German diets, and was erected into a free imperial city by Emperor Henry V. The most famous diet held here was that at which Luther defended himself before Charles V. and the princes of the empire (commemorated by an imposing monument to Luther erected at Worms 1868). The industry and commerce of Worms were great during the middle ages, and its pop., as far back as the time of the Hohenstaufens, averaged probably 60,000 to 70,000; and even amounted to 30,000 at the close of the Thirty Years' War; but the town was almost destroyed by the French in the war of 1689; and though soon rebuilt on a smaller scale, it has never recovered its former prosperity. The site of the old town is only partially occupied by the present one, the rest being laid out in gardens. Here, 1743, an offensive and defensive alliance was entered into by Great Britain and Austria with Sardinia. Pop. (1900) 40,705.

WORMS, *wėrmz:* for the natural history of the worms which infest the human subject, and the remedies to be employed for their expulsion, see ASCARIS: ENTOZOA: TAPEWORM: VERMIFUGES: also PARASITES: PARASITIC DISEASES. It is now necessary to refer only to the symptoms usually considered indicative of the presence of worms, especially in children. These symptoms are, however, in reality, only evidence of irritation of the mucous membrane of the intestinal canal, which may be due to other causes than worms, e.g., to the presence of indigestible matter, unhealthy secretions, or a morbid condition of the membrane itself. Indeed, the latter, according to good authority, seems necessary, in many instances, for production of any symptoms, even when worms are present; as they have been passed by children in perfect health, who experienced no inconvenience on their account. Even the evacuation of worms does not

prove that the symptoms present were caused by them, though doubtless they are likely to have been aggravated thereby. The worm *may* have been but an accidental accompaniment—a morbid condition of the mucous membrane being the true source of the symptoms. Although all the symptoms commonly referred to the presence of worms may exist without them, yet there is a group of symptoms which with approximate certainty indicate their presence, especially when occurring together. These symptoms are divisible into (1) those dependent directly on the presence of worms in the intestines; (2) those connected with the sympathetic relations of the digestive organs, and due to some form of reflex nervous action.

(1) Worms may be suspected to be present when a child looks pale and grows emaciated, while his belly swells and becomes hard—a gnawing or twisting pain being felt in the stomach or about the navel. The appetite is variable, at times voracious; the breath is fetid; the bowels are often deranged, diarrhea alternating with constipation, and much mucus is passed in the stools. There is commonly picking of the nose, or irritation (often excessive itching) is felt in the lower part of the bowels; and when a child is old enough, he may complain of a sense of sinking or fainting.

(2) Among the most marked sympathetic symptoms are those of the head. The sleep becomes unquiet, and the little patient is liable to start up suddenly from slumber; grinding of the teeth is common; the pupils are often dilated, and there may be headache, and sometimes convulsions—symptoms painfully like those of Hydrocephalus, but often disappearing on the expulsion of worms. A dry cough, unaccompanied by any signs of disease of the thoracic organs, is regarded as a sympathetic or reflex symptom of worms; and vomiting, hiccough, diarrhea, tenesmus, and bloody stools often accompany their presence. The Round-worm (*Ascaris lumbricoides*) may be present in the small intestine (its ordinary seat) in large numbers without occasioning any disturbance; but when it does give rise to symptoms, the most prominent are sharp colicky pains about the navel, faintness, great emaciation, and voracious appetite. Thread-worms (*Ascaris* or *Oxyuris vermicularis*) occur chiefly in the rectum, where they often exist in large numbers looking like bits of cut thread. In a recently voided stool they are seen in rapid motion; hence they are called *Ascarides* [from Greek *askarizein*, to jump], hence, also, probably, the great distress which they occasion as compared with the quiet round-worms. The characteristic sign of the presence of these thread-worms is the itching and irritation in the rectum.

WORMS, or VERMES, *vėr'mēz:* general name for a class of elongated creeping creatures with bodies composed of movable rings or joints, and destitute of limbs or with very short ones; until lately treated as a sub-

division of the ARTICULATA (q.v.), but now usually forming a separate main division (see ZOOLOGY). Huxley confines the synonymous terms ARTICULATA and ARTHROPODA to Insects, Myriapods, Archnidans (see ARACHNIDA), and Crustaceans; and places the higher worms, or *Annelids* (the *Annelida*), with the above classes, in a primary division or sub-kingdom of ANNULOSA; and the less highly organized worms, *Scolecids* (in which he includes the *Rotifera* or wheel-animalcules, the *Trematoda* or flukes, the *Tæniadæ* or tape-worms, the *Nematoidea* or thread-worms, the *Acanthocephala* and the *Gordiacea*), in a sub-kingdom to which he applies the term ANNULOIDA. The main reasons of his placing the worms under two great subdivisions are: (1) that the Annelids resemble the Arthropoda in the arrangement of the nervous system, which constitutes a ganglionated double chain, traversed at one point by the œsophagus; (2) none of the Scolecids possess any characters in common with the Arthropoda generally, or with the Annelids, other than those which they have in common with all animals. No scolecid has a definitely segmented body, or bilaterally disposed successive pairs of appendages, nor has it a longitudinal chain of ganglia. These grounds of difference outweigh, in his opinion, the many points of resemblance between the Annelids and the Scolecids—as (1) the resemblance between the ciliated larvæ in many cases; (2) the resemblance between the forms of the mature bodies of many Scolecids with that of one of the most familiar of Annelids, which is so close as to have acquired for the Scolecids the popular name of 'worms'; (3) the fact that in the Annelids we see the representatives of that singular system of vessels which attains a perfect development in the 'water-vascular' apparatus of many Scolecids. The final settlement of the classification of these animals must be decided by further investigation.

With regard to the general characters of worms, it is well known that they are usually of very elongated form. In the higher groups the division of the body into a number of segments is very distinct; while in some of the lower forms no segmentation can be detected. The segments, when present, are usually homonomous, or, in other words, are mere repetitions of one another. The soft and contractile body may be cylindrical or slightly compressed, or it may be flat and broad, and usually presents a distinct dorsal and abdominal surface. The lateral region is often provided, in the higher forms, with special appendages, resembling minute stumps, which take part in the respiratory process. Among the cuticular appendages must be mentioned the bristles (*setæ*), hairs, hooks, etc., which are often seen. The nervous system appears in the Scolecids to become more and more rudimentary, till in the parasitic worms it totally disappears. The mouth is absent in the lower forms, but in the higher

lies in the mesial line of the abdominal surface, in close approximation to the chief nervous (pre-oral) ganglion, from which most of the organs of the senses derive their nerves, as the eye, the auditory apparatus, and the organs of touch (especially the lips). Some of the parasitic worms, e.g., the tapeworms, etc., are totally devoid of an intestinal canal; others, as the Turbellaria (with few exceptions) and the Trematoda, have an intestine, but no anal aperture; while the rest have an intestine provided both with mouth and anus. The latter, when present, lies on the posterior part of the body, and sometimes (as in many Turbellaria) on the dorsal surface. Except in the Gephyrea or Sipunculacea, the intestine, when present, is simple, and devoid of convolutions, but is often, as in the leech, provided with lateral blind sacs. The vascular system in the most highly organized worms, consists of a closed system of arteries and veins, presenting modifications in different genera. A large vessel which runs beneath the dorsal integument may be seen under a microscope to contract and propel the blood forward, thus fulfilling the functions of a heart, and being the homologue of the dorsal vasiform heart of insects; while a corresponding venous trunk conveys the blood in an opposite direction, and runs along the under surface of the body. These great trunks are united at each segment by transverse vessels, which carry the blood from the ventral vein to the dorsal artery. In the Nematelmia, or parasitic round-worms, the system is much simpler; and in the lowest worms no trace of true blood-vessels is discernible. None but the Annelida (q.v.), or highest worms, possess special respiratory organs. These occur in various forms. Thus, in the leech and earthworm a series of pores on each side of the body lead to as many simple sacculi formed by an inward folding of the integument. In the tubicolous Annelids, such as the *Serpula*, the respiratory organs are in the form of long flattened branchiæ, radiating from the head, and generally disposed in a spiral form. When not filled by the red circulating fluid, which the Annelids generally possess, they are often beautifully tinted with purple, green, and yellow colors, and form a gorgeous crown. In the *Arenicola piscatorum* (figured in the article ANNELIDA) the respiratory organs are seen lying as lateral tufts in the middle part of the body (14 or 16 in number on each side). In the lower worms there are no definite respiratory organs, the process being carried on partly by the surface of the skin generally, and partly by the water-canals noticed in the article TAPEWORM. As a general rule, the worms are hermaphrodites, only one of the five classes into which they are divided—viz., the *Nematelmia* having the sexes separate. A large number of the lower kinds are parasitical; the others are inhabitants of sea and fresh water, mud, earth, etc.

The worms are arranged by Carus in the five classes:

(1) *Annulata,* corresponding to the *Annelids* of Owen: see ANNELIDA. (2) *Gephyrea,* including the Sipunculus and its allies: see SIPUNCULOIDEA. (3) *Chætognatha,* including the single genus *Sagitta,* a little fish-like animal with a distinct head, the mouth armed with several pairs of lateral hook-like jaws, with an elongated body furnished with one or two pairs of fin-like organs, and with a broad and usually bilobed caudal fin. (4) *Nematelmia,* described in a special article. (5) *Platyelmia* or *Flatworms,* divisible into the three orders: (1) *Turbellaria,* including the Planarias, etc.; (2) *Trematoda,* including the Flukes; (3) *Cestoidea,* including the Tapeworms. (See each of these titles.)

For further information consult works and memoirs of Milne-Edwards, Grube, De Quatrefages (especially *Rambles of a Naturalist*), Schmarda, Blanchard, Leuckart. Darwin's book on *The Formation of Vegetable Mould through the Action of Worms* (1881) contains much as to the habits of earthworms (see EARTHWORM). See also *Monograph of British Annelides,* pub. under the auspices of the Ray Society.

WORMS, or WORMS, *vorms:* island in the Baltic, e. of Dagö, belonging to the Russian govt. of Esthenia; about 36 sq.m. It is flat and generally well wooded in the interior, and throws out numerous steep promontories, round which strong currents run, so that, often for months together, it is cut off from all intercourse with the neighboring islands of Oesel, Dagö, Runö, etc., as well as with the mainland; and thus the inhabitants, who are of Swedish origin, have remained unmixed with foreign elements. A stranger is a surprising rarity on this island; and he, in turn, is not less surprised at the peculiar old Swedish dialect, the architecture, and the manners and customs of this small, poor, but happy insular people.

WORM-SEED: popular name for santonica, from which Santonin (q.v.) is extracted.

WORM-SHELL: one of the curiously uncoiled and distorted gastropod mollusks of the marine family *Vermetidæ,* whose shells might easily be mistaken for the tubes of annelids, such as Serpula. They are free and spiral in early life, and crawl about like ordinary gastropods, but they afterward settle down and become attached to stones, etc., for the remainder of their lives. The animals are worm-like, with a short proboscis, horny jaws and radula, and two short tentacles. When they become stationary the foot, being of no further use as a locomotive organ, becomes modified into an organ of attachment, and the shell stretches out irregularly. The species are not numerous and occur mainly within the tropics.

WORMWOOD, n. *wėrm'wûd* [AS. *wermód;* Dut. *wermoet;* Ger. *wermuth,* wormwood: probably no connection with *worm* and *wood,* but from AS. *werian,* to protect,

and *mód*, courage, mind—*lit.*, a mind-preserver]: a plant, *Artemisia absinthium*, possessing intensely bitter, tonic, and stimulating qualities.—*Wormwood* is becoming somewhat naturalized outside of gardens in the United States. It acts not only as an anthelmintic, as its name implies, but it also has tonic and stimulant properties, which prevent the reproduction of worms after their expulsion. An *Infusion of Wormwood*, made by pouring a pint of boiling water over an ounce and a half of the dried plant, letting it stand for an hour, and straining, taken in doses of a couple of ounces once or twice a day, is a very good domestic tonic, and may be prescribed with advantage even in cases where worms are not suspected.

WORN, v. *wōrn:* pp. of WEAR.

WORNIL, n. *wėr'nĭl* [a dim. from *worm*]: the larva or maggot of an insect found on the backs of cattle; a tumor formed on the backs of cattle by this larva: also WOR'NAL, n. *-năl*, and WOR'MUL, n. *-mŭl*.

WORONZOFF, MICHAEL SEMENOVITCH, Prince: Russian statesman and general: b. Moscow 1782, May 17; d. Odessa 1856, Nov. 18. He was educated in England, where his father was Russian ambassador, entered the Russian army in 1801, served against the Turks, and distinguished himself in the war with France. He was severely wounded at Borodino and commanded the cavalry at the battle of Leipsic in Oct. 1813. Ten years later he was named governor of New Russia and Bessarabia, and in 1844 governor of the Caucasus. He carried on the war with the mountain tribes, and took Shamyl's stronghold, Dargo, 1845, July 18.

WORRY, v. *wŭr'rĭ* [Dut. *worgen*, to strangle, to choke: OHG. *wurgan;* Ger. *würgen*, to choke: Fris. *wergia, wirgia*, to strangle: Dut. *worg*, quinsy]: to choke; seize by the throat or neck with the teeth, as dogs in fighting; to bite at; to mangle with the teeth; to harass with care or anxiety, or with importunity; to tease; to fatigue; to persecute brutally; to be solicitous or anxious: N. the act of worrying; harassing trouble in any matter; a thing which brings irritating care and anxiety. WOR'RYING, imp. WOR'RIED, pp. *-rĭd*. WOR'RIER, n. *-rĭ-ėr*, one who worries.

WORSAAE, *vor'saw-ėh*, JENS JACOB ASMUSSEN: Danish archæologist: 1821-1885, Aug. 15; b. Veile, in Jutland, where his father was *justitsraad*, or councilor of justice. Worsaae went 1833 to Copenhagen, with the intention of studying theology. Having, however, soon exchanged his theological studies for law, and again as speedily relinquished the latter, he turned his whole attention to the history and archæology of the north, which had long attracted him; and in 1838 he obtained the place of assistant in the Royal Museum of Northern Antiquities at Copenhagen. In 1844 appeared Warsaae's

work, *Runamo og Bravalla Slagct*, in which he definitely settled the long-pending question as to the Blekinge rock inscriptions, showing that the supposed runes were no runes at all, but mere weatherings of the rock; and consequently that the interpretations of them by scholars were purely imaginary. This bold but conclusive solution of a problem which had long occupied the most learned men of the north placed Worsaae in the foremost rank of northern archæologists. The Danish government defrayed the expenses of several of his journeys of research, whose results were the publication of numerous works and papers—e.g., *Minder om de Danske og Nordmænderne i England, Skotland og Irland* (Copenhagen 1851), or Memorials of the Danes and Norwegians in England, etc. (Eng. transl. 1852); and his treatise *Om en forhistorisk saakaldet tysk Befolkning i Danmark* (Copen. 1849); etc. He published several important works on the archæology of his native country. Worsaae was an ardent patriot, and a strenuous opponent of the spread of German tendencies in the duchies: see his *Jylland's Danskhed* (1850). He was minister of education 1874-5. He died near Holbäk, in the island of Zealand.

WORSE, a. *wėrs* [AS. *wyrs;* Goth. *vairs;* Icel. *verri;* Dan. *værre;* OHG. *wirs*, worse]: used as the comparative of the adjectives *bad, evil*, and *ill;* bad, evil, or ill in a greater degree; more depraved and corrupt; more sick; not so well; less favorable: AD. in a manner more evil or bad: N. disadvantage; loss, hence 'to put to the *worse*,' to defeat, as, 'Judah was put to the *worse*;' something less good, as, 'he does not think the *worse* of him for it': V. in *OE.*, to put to disadvantage. WORST, a. *wėrst* [AS. *wyrsta;* Icel. *verstr;* Dan. *værst*]: superl. degree of *bad, evil*, and *ill;* bad, evil, or ill in the highest degree: N. the most evil or calamitous state; the height, in an ill sense: V. to get the advantage over in contest; to defeat. WORST'ING, imp. WORST'ED, pp. WORSER, a. *wėrs'ėr*, OE. redundant form of WORSE. WORS'EN, v. *-n*, to become worse; in *OE.*, to make worse.

WORSHIP, n. *wėr'shĭp* [AS. *weorthscipe*, state of worth, worthiness—from *weorth*, worthy, honorable, and *-ship*, state of (see WORTH)]: honor; dignity; good name; reverence; respect; the reverence, homage, and adoration due to God; the act of paying honors to God; fervent esteem or admiration; submissive respect; a title of honor used in addressing magistrates, etc.: V. to pay divine honors to; to adore; to perform religious service; to honor highly or to excess; to idolize; to honor. WOR'SHIPPING, imp.: N. the act of paying divine honors to. WOR'SHIPPED, pp. *-shĭpt*. WOR'SHIPABLE, a. *-ă-bl*, worthy of being worshipped or adored. WOR'SHIPPER, n. *-pėr*, one who worships; also spelled *worshiper*. WOR'SHIPFUL, a. *-fûl*, worthy of honor from his character or

dignity; a respectful epithet applied to magistrates, etc. WOR'SHIPFULLY, ad. *-lĭ*, in a worshipful manner; respectfully.—SYN. of 'worship, v.': to reverence; revere; venerate; honor; adore.

WORST, a. n. *wėrst:* see under WORSE.

WORSTED, n. *wûs'tĕd* or *wûr'stĕd* [from *Worsted*, a village near Norwich, in Norfolk]: thread spun from long combed wool and twisted hard, used for hosiery, and for carpets and various stuffs, such as merino, alpaca, Coburg, paramatta, etc.; also a loose woolen yarn of Berlin wool is a variety used for ornamental needlework, etc.: ADJ. consisting or made of worsted: N. a worsted yarn or fabric (see WOOLEN AND WORSTED MANUFACTURES).

WORT, n. *wėrt* [O. Dut. *wort;* Icel. *virtr;* Low Ger. *wört*, wort (see WORT 2, of which this is only a particular application)]: the decoction of barley of which beer is made; new beer unfermented or in act of fermentation (see BEER).

WORT, n. *wėrt* [Ger. *wurz*, a herb, grass: Icel. and Dan. *urt*, a plant: Goth. *vaurts*, a root]: a plant; a herb; now used only in compound words, as *colewort, liverwort.*

WORTH, n. *wėrth* [AS. *weorth*, price, value: Goth. *vairths*, worth, price: Icel. *verd*, price, money: Dut. *waard*, worthy: Ger. *werth*, worth]: that quality of a thing which gives to it a value; value expressed in terms of some standard of exchange; price; rate; excellence; merit; usefulness; virtue; comparative importance: ADJ. equal in value to; as, it is not *worth* the money; deserving of; having an estate or means to the value of, as, he is *worth* a million; in *OE.*, valuable. WORTH'LESS, a. *-lĕs*, without value; without virtue or moral excellence; degraded; in *OE.*, not meriting. WORTH'LESSLY, ad. *-lĭ.* WORTH'LESSNESS, n. *-nĕs*, the quality of being worthless; want of value, excellence, and the like. WORTHY, a. *wėr'thĭ*, having worth or excellence; deserving, in a good or bad sense; meritorious; estimable; having qualities suited to; equal in dignity: N. a man distinguished in the service of his country; one who is noted for his eccentricities or peculiarities; in *OE.*, anything which contributes to make worthy or excellent: V. in *OE.*, to render worthy; to aggrandize. WOR'THILY, ad. *-thĭ-lĭ*, in a manner suited to; according to merit; justly; deservedly. WOR'THINESS, n. *-nĕs*, desert; merit; excellence; virtue.

WORTH, v. *wėrth* [AS. *weorthan*, to become: Dut. *worden;* Dan. *vorde:* Ger. *werden*, to be, to come to pass]: in *OE.*, to become; to betide—now used only in the phrase 'woe *worth* the day,' equivalent to 'woe *be to* the day.'

WÖRTH, *vört:* village of Alsace-Lorraine, at the confluence of the Sauer and the Salzbach; about 10 m. s.w.

of Weissenberg. Here, 1870, Aug. 6, the French, under MacMahon, were outflanked and defeated with great loss by the Germans, commanded by the crown-prince, who took 4,000 prisoners. Wörth suffered considerably during the battle, hand-to-hand fighting taking place in its streets.—Pop. more than 1,000, mostly Protestants.

WORTH, William Jenkins: soldier: 1794, Mar. 1—1849, May 17; b. Hudson, N. Y.; of good Quaker family. After a common-school education and a short mercantile experience, he entered the army as 1st lieut. 1813, Mar. 19; served as aide to Gen. Winfield Scott; was promoted capt. for gallantry 1814, Aug. 19; and major for distinction in the battle of Niagara. At the close of the war he became supt. of the U. S. Milit. Acad., lieut.col. 1824, col. 1838, and in the Florida war defeated the Seminoles 1842, Apr. 19. In the war with Mexico he was second in command; was the first to plant the U. S. flag on the Rio Grande; conducted the negotiations for the surrender of Matamoras; was assigned by Taylor to the hazardous undertaking of the assault at Monterey on the bishop's palace; was under Scott on the Gulf coast and in all the battles from Vera Cruz to Mexico; took a chief part in the capture of Puebla; and was the first to enter the City of Mexico and haul down the Mexican flag. His death from cholera occurred while in command of the dept. of Texas. He was brevetted maj.gen. and given swords of honor by congress and by the states of N. Y. and La. A fine monument to his memory was erected in New York city.

WORTHEN, William Ezra: American civil engineer: b. Amesbury, Mass., 1819, Mar. 14; d. New York 1897, Apr. 2. After graduation from Harvard in 1838, he began the practice of civil engineering, and until 1848 was employed chiefly with surveys connected with the Boston water-supply, and in other hydraulic works. He designed and constructed several mills in Lowell, in 1849 began architectural work in New York, was made engineer of the New York and New Haven railway, and in 1854 its vice-president. After 1854 he was busily employed as a practicing and consulting engineer, being frequently retained as an expert in matters relating to the planning, construction, or improvement of sewage and water systems. He was chief engineer of the first rapid transit commission of New York, and in 1890-1 chief engineer of the Chicago main drainage canal. In 1887 he was president of the American Society of Civil Engineers. Besides official reports, he published: *Cyclopædia of Drawing* (1857); *First Lessons in Mechanics* (1862); and *Rudimentary Drawing for Schools* (1863).

WORTHING, England: a watering-place in Sussex, 12 m. w. of Brighton; with good streets, handsome terraces, crescents, and villas, splendid hotels, baths, smooth sands, a beautiful esplanade, libraries, a literary institution, reading-rooms, and assembly-rooms. Fruit-grow-

ing is an important industry of the town. Pop. (1901) 20,006.

WORTHINGTON, George, d.d.: American Protestant Episcopal bishop: b. Lenox, Mass., 1840, Oct. 14; d. 1908, Jan. 7. He was graduated from Hobart College in 1860 and from the General Theological Seminary in 1863. He took priest's orders in 1864, was rector of St. John's Church, Detroit, 1868-85, and was consecrated bishop of Nebraska in 1885.

WORTHINGTON, Henry Rossiter, m.e.: American inventor: b. New York 1817, Dec. 17; d. Tarrytown, N. Y., 1880, Dec. 17. In 1840 he began a series of experiments with steam for the propulsion of canal boats, soon afterward devised a small steam pump to be used in the maintenance of the water supply in the engine boiler, and in 1841 patented an independent feed pump which developed into the direct-acting steam pump that he patented in 1849. Subsequently he built in Savannah, Ga., the first direct-acting compound-engine ever used in waterworks; invented the duplex pump, and devised various improvements in steam and hydraulic machinery.

WORTHINGTON: village, county-seat of Nobles co., Minn.; on the Burlington, C. R. and N., and the Chicago, M., St. Paul and O. railroads; nearly 100 m. n.e. of Sioux City, Ia. It is in an agricultural section. It has flour mills, grain elevator, stock-yards, and machine shops. The three banks have a combined capital of $125,000. The village has a high school established in 1883, and a public library. Pop. 2,450.

WOTTON, *wŏt'on,* Sir Henry: English author: 1568, Apr. 9—1639, Dec.; b. Bocton Hall, Boughton Malherbe, Kent. He was educated at Winchester New College and at Oxford. From 1589 to 97 he was on the continent, in the principal cities; his longest residence was in Italy, where he improved his opportunities for learning. Afterward he was sec. of the Earl of Essex in Spain and Ireland. Revisiting Italy, he was sent by the grand duke of Tuscany, 1602, to warn King James of Scotland of a plot against his life; and when James succeeded to the throne of England, Wotton was knighted, was thrice ambassador to Venice, and was sent on other missions. In 1625 he became provost of Eton College, and took orders in the church. He wrote also *Elements of Architecture* (1624); and *The State of Christendom* (1657), giving an account of political intrigues in Europe. Izaak Walton wrote his life, and collected his poems and miscellaneous writings in a volume, *Reliquiæ Wottonianæ.*

WOTTON, William, d.d.: English divine: 1666, Aug. 13—1726, Feb. 13; b. Wrentham, Suffolk. His father taught him in his early childhood; and such was his precocity that at 5 years of age he could translate chapters from Latin, Greek, and Hebrew. He entered Cambridge at the age of 10 and graduated at 12, acquainted

with 12 languages. He was fellow at Cambridge 1685; chaplain to the Earl of Nottingham and rector of Middleton Keynes 1693; prebendary of Salisbury 1705; and retired to Wales 1714, where he preached in Welsh. He was author of *Reflections on Ancient and Modern Learning* (1694); *A History of Rome* (1701); *Traditions and Usages of the Scribes and Pharisees* (1718), translated from the Mishna; and edited the *Laws of Hoel the Good* (1730), in Welsh and Latin.

WOULD, v. *wûd* [see WILL]: the pt. of WILL (q.v.); wish or wished to; determined to, as, he *would* speak; *familiarly,* wish to do, or to have; should wish; I wish or I pray, as, '*would* to God.' WOULD-BE, a. vainly professing to be: N. a pretender.

WOUND, n. *wônd* or *wownd* [AS. *wund;* Dut. *wond;* Icel. *und,* a wound: Ger. *wund;* Goth. *vunds,* wounded]: a cut or similar injury to the skin or flesh; any hurt or injury given by violence; injury; bruise: V. to cut or rend the skin or flesh; to hurt or injure by violence. WOUND'ING, imp.: N. hurt; injury. WOUND'ED, pp. WOUND'ER, n. *-ĕr,* one who wounds. WOUND'LESS, a. *-lĕs,* free from wounds; that cannot be wounded. WOUNDY, a. *wownd'ĭ,* in *OE.,* excessive. WOUND'ILY, ad. *-ĭ-lĭ,* in *OE.,* excessively.

WOUND, v. *wownd* [see WIND 1]: pt. of verb *wind.*

WOUNDS, *wôndz:* injuries or lesions produced by external mechanical force, and involving usually discontinuity or division of the skin or tissues of the body. Wounds may be classified as *open* and *subcutaneous* wounds: the former including those in which the skin is broken, and the latter all those in which there is no break in the integument, or practically none. These wounds (especially those of the first kind) may be further divided into (1) *incised wounds,* such as cuts or incisions, including those which remove a portion of the body; (2) *punctured wounds,* such as stabs; (3) *contused wounds,* in which the divided parts are bruised or crushed; (4) *lacerated wounds,* in which there is tearing of the tissues; (5) *poisoned wounds,* in which some poison or venom is inserted; and (6) *gunshot wounds.* In a clean cut, whether made accidentally or in a surgical operation, three things are chiefly to be observed—viz., the opening or gaping by the retraction of its edges, the bleeding, and the pain. The *gaping* of a wound is caused by the retraction of the various tissues which are divided. Of the various tissues, the skin shows the greatest degree of retraction, and then (in the order in which they stand) elastic tissue, cellular or connective tissue, arteries, muscles, fibrous tissues, nerves, and cartilages. In addition to the immediate gaping of fresh wounds, many wounds, if not prevented, will continue to retract for a long time —e.g., in stumps that heal slowly, the limb terminates in

a cone, in consequence of the prolonged retraction of the muscles. The *bleeding* from an incised wound depends chiefly on the size and number of the divided vessels, and on their connection with the surrounding parts, but to a certain extent on the previous condition of the wounded part, or on the peculiar constitution of the patient. Gradually, with or without surgical help, the vessels cease to bleed; and then, if the wound be left open, there is an oozing of blood-tinged serous fluid, succeeded gradually by a paler fluid, which collects like a whitish film on the surface, and contains an abundance of white or colorless blood cells, imbedded in a fibrinous (therefore spontaneously coagulating) fluid. The nature of the *pain* cannot be made clear by any description to those who have not felt it; and it is more than probable that a similar wound inflicted on two or three persons would occasion different degrees of pain in each. In regard to the skin, wounds of the face and of the extremities of the fingers and toes seem to be among the most painful; those of the back among the least so; and wounds cut from within are less painful than those from without. The skin appears far more sensitive to wounds than any of the deeper structures, except the nerves of sensation themselves; but any part (as periosteum or tendons) may become, by disease or distention, highly sensitive. The *local consequences* of an incised wound are indicative of inflammation. In the course of an hour or more, the edges of the wound and the adjacent parts become swollen and abnormally sensitive, feel hot and aching; the sutures (if any have been inserted) become tighter, and the edges and intervening spaces gape in consequence of the swelling. These symptoms gradually subside in two or at most four days, unless there is some abiding source of irritation. Except in very severe wounds, no *general consequences* are apparent. In these exceptional cases, e.g., in amputations, a shock and subsequent reaction (for these, see SHOCK) are observed. The duration of this feverish reaction or traumatic fever does not seem to bear any fixed relation to the severity of the injury. Sometimes it subsides within 24 hours; more often, after large wounds, it does not subside for three or four days, when the pulse and breathing gradually return to their natural standard, and the skin becomes soft and cool. The beginning of suppuration often coincides with the subsidence of the fever. If the fever should last more than four or five days after receipt of the injury, there is probably some persistent irritation or some morbid complication.

The *healing* of open incised wounds may be accomplished in five different ways, if we include those in which the process is assisted by treatment—(1) by immediate union, or (in surgical language) by union by first intention; (2) by primary adhesion, or union by adhesive in-

flammation; (3) by granulation, or by second intention; (4) by secondary adhesion, or third intention—i.e., by the union of granulations; (5) by scarring under a scab, the so-called subcutaneous cicatrization. *Healing by immediate union* takes place when the wounded parts, being placed and maintained in contact, first stick together, and then become continuous, without formation of any new material as a connecting medium—e.g., a flap of skin is raised by dissection in the removal of a tumor or a mammary gland, and is then replaced on the subjacent parts: in three days at most, if perfect asepsis has been maintained, the union may be complete, without any indication of inflammation, there being no evident efflux of blood, no exudation of reparative material, and no scar. In *healing by primary adhesion*, lymph exudes from both cut surfaces, becomes organized, gradually connects the cut surfaces, and at length forms between them a firm layer of connective tissue, covered with a thin shining cuticle. These steps are well seen after the operation for hare-lip. In *healing by granulation*, the wound becomes coated over with the white film, containing colorless blood-cells, as above described. If these glazed surfaces are brought and kept together, they will probably unite, the film becoming organized, and contributing to form a bond of union; but if the wound be left open the film increases, and takes part in the formation of Granulations (q.v.). We cannot enter into the life-history of these granulations, and can only remark that they are finally developed into a scar, consisting of fibrocellular or connective tissue, with a superficial layer of epidermis. The completion of the healing is accomplished by the gradual improvement of the scar, in which the connective tissue becomes more perfect in its character, and the cuticle becomes thicker and more opaque. *Healing by secondary adhesion*, or by third intention, 'is accomplished by the union of two granulating surfaces (e.g., those of two flaps after amputation) placed and maintained in contact. In this state the two surfaces simply unite, or else new material, produced from either or both surfaces, adheres to both, is organized into continuity with both, and then unites them. Since the perfecting of the technique of aseptic surgery, healing of ordinary operative wounds other than by 'first intention' is unusual. *Healing by scabbing*, or under a scab, is, according to the same authority, the most natural, and in some cases the best of all the healing processes. In animals it is often observed that if a wound be left wide open, the blood and other exudations dry on its surface, and form an air-tight covering, under which healing takes place, and which is cast off when the healing is complete. In man, this process is less frequent, because, in the first place, exudations seem to be more often produced under the scab, which detach it and prevent the healing; and,

secondly, surgical interference seldom allows this method a fair trial.

Such are the several modes of healing of simple, incised, and all open wounds. We have now to consider the nature of the processes therein concerned. Every wound is followed by more or less tendency to an inflammatory process. This tendency may not proceed beyond an increased sensibility of the part and a slight efflux of blood, and there may be no inflammatory exudation; this is the usual course in the case of wounds made in modern surgical operations, and affords the best condition for healing by immediate union in which no new material is required; or the inflammatory process may go on to the production of lymph, and then cease—a condition essential to healing by adhesion. In healing by granulation, a very low degree of inflammation (such as is requisite for the effusion of the first materials for granulation) is best; while for healing by secondary adhesion or by scabbing, inflammation must be altogether absent. The due understanding of these relations of inflammation and the healing processes of open wounds affords important aid as to the *mode of treatment*. The position of the wounded part is a subject of considerable importance. The parts should be relaxed, so that the edges of the wound may come near or together and that no part, and especially no muscle, should be on the stretch. If the bleeding arise from vessels of considerable size, they must be tied, twisted, and pressed, or crushed at their ends; but all these means, and especially ligature, should be avoided if possible, because they are impediments to exact union; and spontaneous closure of the vessels by the action of cold air or water, and pressure with dry lint, is preferable. The cleaning of the wound is best effected by allowing a gentle stream of water to flow over it. Soft gauze pads are sometimes useful for this purpose; but they must be used as dabbing (not as scrubbing) agents, and they must, of course, be sterile—that is, free from any bacteria. Apposition is effected by padding and bandaging, Sutures (q.v.), and adhesive plasters—the former being useful in deep wounds, while the latter two serve for more superficial wounds. See ANTISEPTIC SURGERY.

Of the other varieties of wounds, it is sufficient to notice the most important points severally peculiar to each variety. Of *punctured wounds*, the most serious are those made with blunt-pointed instruments, such as nails, pitchforks, iron spikes, etc., for by these the injured parts are not so divided as that they may retract, but are pressed aside with much bruising, and can close again as soon as the instrument is withdrawn; and in this lies the chief danger of these wounds, because blood or other fluids are likely to extravasate into them, and cannot readily escape. These fluids, by decomposing or by mere pressure, may excite inflammation, and thus cause deep

and confirmed suppuration and great destruction of tissues. Some of the worst forms of these wounds are those produced by sharp teeth, probably because of the force with which, as they tend to meet, the teeth crush the intervening parts. The great danger in a punctured wound is that some poison such as the germs of tetanus, for example, may be introduced with the wounding instrument and then be retained when the wound closes. In *contused wounds*, the great question is, whether their union should or should not be attempted. If union is to be attempted, the same treatment as that of incised wounds must be followed. When it would be useless, from the extent of the bruises, etc., to attempt union, the following rules should be adopted: The part should be kept at rest, and as nearly as possible at its natural temperature. For the latter purpose, and for protection, an excellent dressing is antiseptic gauze or cotton-wool thoroughly soaked in sterilized olive-oil and completely fitted to the part. Dry cotton-wool may be applied over this, or oiled-silk. Water-dressing may be similarly applied, or warm poultices; but they are generally less comfortable. Irrigation is, in some cases, very soothing, especially in ragged wounds, but it should be with tepid water. The methods of the dressing, after the first, may be almost the same as for incised wounds. The treatment of *lacerated wounds* is almost precisely the same as that of contused wounds. For *poisonous wounds,* see VENOMOUS BITES.

It must be noted that various kinds of wounds are liable to certain complications, of which some are local, and others general or constitutional. Among the former are recurring or secondary bleeding, pain, spasmodic muscular movements, and the presence of foreign bodies; while the latter include defect or excess of reaction, traumatic delirium, fever, erysipelas, pyæmia, etc.

WOUND-WORT, n. *wônd-:* the herb Betony; *Stachys Betoníca,* ord. *Labĭātæ.*

WOURALL. See WOORALI.

WOUWERMAN, *wow'vėr-mân* (or WOUVERMANS, *-mâns*), PHILIP: Dutch painter: 1619, May—1668, May; b. Haarlem. From his father, Paul Wouwerman, historical painter, he inherited a taste for art: after studying with him, he studied with John Wynants. He passed his whole life at Haarlem in the assiduous practice of his art; and though his pictures are now highly valued, he is said to have had little immediate success, and to have lived in poverty, often in the hands of the picture-dealers. His pictures are mostly landscapes of small size, with figures profusely introduced, usually in energetic action. His battle-pieces, in particular, are greatly admired for spirit and vigor. Seven or eight hundred pictures are ascribed to Wouwerman; but many of these are probably the pro-

ductions of his two brothers, JOHN and PETER, who executed subjects somewhat similar: both were artists of considerable merit, but much inferior to Philip. His authentic works show great variety and fulness of incident, vivacious figures, skilful animal-painting, and admirable landscape backgrounds.

WOVE, pt. *wōv*, WOVEN, pp. *wōv'n*, of WEAVE (q.v.). WOVE PAPER, a writing-paper with a uniform surface, and not ribbed like *laid-paper*.

WRACK, v. *răk* [see WRACK 2]: to tear or rend asunder; to destroy; to break to pieces: N. crash; ruin; destruction. WRACK'ING, imp.: ADJ. ruinous; destructive. WRACKED, pp. *răkt*. WRACK'FUL, a. *-fûl*, in *OE.*, ruinous.

WRACK, n. *răk* [F. *varech*, sea-weed, wreckage: Icel. *reka*, to cast, to drive: Dan. *vrag*, wreck: Sw. *vrak*, refuse, trash (and see WREAK: WRECK)]: anything cast ashore by the waves, specifically seaweed cast ashore; a sea-plant of the genus *Fucus*, whose stalks are terminated by watery bladders—used for making kelp, and as a manure; also, a sea-plant having long grass-like leaves—collected for packing, and for stuffing mattresses.—*Wrack* is sometimes applied indiscriminately to any of the larger *Algæ* of the sea-shores, but is usually restricted to species of the genus *Fucus* (see FUCACEÆ). Algæ of this genus have a leathery, dichotomous, generally flat, linear frond, usually furnished with large air-cells, which are included in the substance of the frond; the spores arranged in tubercles, imbedded in mucus, and collected in *receptacles*, through whose pores they are finally discharged. *F. vesiculosus*, popularly known as *Sea-ware*, *Kelp-ware*, and in Scotland as *Black Tang*, is extremely abundant on rocky shores, growing between high and low water mark, and most plentifully near high-water mark, often struggling for existence on the very upper line, and found even among grass and moss in marshy ground occasionally overflowed by the tide. It is the species chiefly employed in the kelp manufacture, because it is more easily collected than any other. It is of dark olive-green color, sometimes 2 or 3 ft. in length; frond flat, entire on the margin, with central rib; air-cells spherical, in pairs, sometimes as large as hazel-nuts; receptacles solitary, terminal, turgid, compressed, mostly elliptical. Oxen, sheep, and deer eat it, seeking it on the sea-shore in winter when other food is scarce. In Gothland it is boiled and mixed with a little coarse flour as food for hogs. It has been used medicinally in glandular affections, owing its value probably to the iodine which it contains.—*F. nodosus* is another species, sometimes called KNOBBED WRACK, growing nearer to low-water mark than the last, therefore not so often and easily accessible, but esteemed the very best species for the manufacture of kelp. It has veinless fronds, branched in a somewhat pinnated

manner, with large solitary egg-shaped air-cells in the central line of the frond. It sometimes attains a length of 6 ft.—*F. serratus* is easily distinguished by its serrated fronds and the lack of air-cells: it is sometimes called BLACK WRACK. It is less useful for kelp than the other species. In Norway it is used as food for cattle, generally sprinkled with a little meal. It is preferred to other species for packing crabs and lobsters to be sent to market, as it keeps them moist, while, having less mucus than the other species, it is less apt to ferment and putrefy. Some other species of *Fucus* are common. The use of wrack for manure is of great advantage to farmers on the seacoast: it is better adapted for light than for clay soils. The effect is beneficial for almost all kinds of crop. The wrack ought not to be allowed to lie long in a heap, as it is injured by fermentation, but be applied to the land as quickly as possible, and covered by the plow.

WRAITH, n. *rāth:* in *Scot.*, an apparition in the exact likeness of a person, and supposed to be seen immediately before death or a little after; an apparition; an unreal image.

WRANGEL, or WRANGELL, *vrâng'gėl*, FERDINAND PETROVICH, Baron VON: Russian navigator: 1796, Dec. 29—1870, June 10. Educated for naval service at St. Petersburg, on duty from 1812, and attached to a scientific expedition to the n. and e. 1817, he was given the command 1820 of an expedition to explore the Russian polar seas, and was absent 1820, Nov. 2—1824, Aug. 15. After a journey round the world 1825-27, he became governor of Russian America (now Alaska), and labored for its development until his recall 1834. He was made rear-admiral 1837, vice-admiral 1847, but resigned 1849 to be president of the reorganized Russian American Company. He re-entered the service 1854, as chief director of the hydrographical department of the navy; became chief assistant to the high admiral, Grand-duke Constantine, 1855, member of the council of the empire 1858, and admiral and aide to the czar, Alexander II., 1859. Several publications reporting his travels and observations have appeared in England translations (1840-1).

WRANGEL, *vrâng'ėl*, FRIEDRICH HEINRICH ERNST, Count VON: Prussian soldier: 1784, Apr. 13—1877, Nov. 1; b. Stettin. He entered the Prussian army 1796, as a dragoon; served through the campaigns against Napoleon; was a colonel at Waterloo, major-general 1823, lieutenant-general 1838; and commanded the second corps of the allied army in the Schleswig-Holstein campaign 1848, and was a part of the time commander-in-chief. He left his position 1848, Sept. 8, to undertake the suppression of the revolution in Berlin, and on his success in this received high honors. He was created a field marshal 1856,

was in the second Schleswig-Holstein war 1864, was for a short time in chief command, until superseded in May by Prince Frederick Charles of Prussia, when Wrangel was made a count. As 'Papa Wrangel,' a veteran of 70 years' service in 1866, he was in his later years one of the curiosities of Berlin.

WRANGEL, Karl Gustaf von, Count: Swedish general: b. Skokloster, on Lake Maelar, 1613, Dec. 13; d. Isle of Rugen, 1675, June 24. He accompanied Gustavus Adolphus in his expedition to Germany, and at the battle of Lützen, in 1632, rendered great services after the fall of the king. In 1641 he was one of the major-generals who commanded the Swedish forces until the arrival of Torstenson, and under him participated in the campaign in Germany, and the famous march to Holstein. After the death of Flemming in 1644 he received the supreme command of the Swedish fleet, and obtained over the Danish fleet a great naval victory on October 13, between the islands of Femern and Laaland. In 1646 he succeeded Torstenson as commander-in-chief of the Swedish army, effected a junction at Giessen with the French forces under Turenne, with whom he crossed the Main and besieged Augsburg, which, however, was relieved by the Austrian army. In 1648 the Swedes and French defeated the Austrians and Bavarians near Zusmarshen, but retired before the army of Piccolomini. Wrangel commanded under Charles X. in the campaigns in Poland (1655) and Denmark (1657-9), and in 1674 led an army of 16,000 men into the electorate of Brandenburg.

WRANGELL, Alaska: village on Wrangell Island, near the mouth of the Stikine river; about 170 m. s.e. of Juneau, and 120 s.e. of Sitka. A settlement was made here by Russians in 1833. It is a trading post for fish and furs. It has a hatchery, salmon canneries, and storehouses. It is a distributing centre for mining camps and interior trading post. Pop. 868.

WRANGEL LAND, *râng'ghĕl:* island or tract of land of unknown extent in the Arctic Ocean, n. of the e. extremity of the Asiatic coast, and intersected by the meridian of 180° e. long. It was discovered 1867 by Capt. Long of the United States, and named after the Russian explorer Baron von Wrangell (1796-1870), who sought to reach it.

WRANGLE, v. *răng'gl* [the frequentative of Wring, which see: Dun. *vringle,* to twist or entangle]; to dispute angrily; to quarrel with much noise; to bicker; to squabble: N. an angry dispute; a noisy quarrel. Wran'gling, imp. *-glĭng:* N. the act of disputing or contending angrily; altercation. Wrangled, pp. *răng'gld.* Wran'gler, n. *-glĕr,* an angry disputant; in the *University of Cambridge,* one of the students who pass in the first class of mathematical honors, the first in the list being

styled *senior wrangler*, and the others *second wrangler*, *third wrangler*, etc., respectively. WRAN'GLERSHIP, n. *-shĭp*, the honor or position of a wrangler.—SYN. of 'wrangle, n.': jar, bicker; jangle; altercation; brawl; contest; controversy.

WRANGLER, *răng'glẽr:* one of those students at the University of Cambridge who have attained the first class in public mathematical honor examinations. The word wrangler is derived from the public disputations in which candidates for degrees were in former times required to exhibit their powers. The examination is confined to mathematics, pure and mixed; it is conducted by two moderators and two examiners, with an additional examiner. The honor men who compose the mathematical *Tripos* (q.v.) number usually about 100, and are divided into three classes—*wranglers, senior optimes*, and *junior optimes*, each placed in order of merit. The head of the tripos is called the *senior wrangler*. Formerly this was the final result of the tripos, and it still holds for the first two parts of the examination; but since 1882 at the end of the third and final part of the examination (six months afterward), at which only the wranglers can compete, the wranglers are divided into three classes, the members of each class being arranged alphabetically. See CAMBRIDGE, UNIVERSITY OF.

WRAP, v. *răp* [prov. Eng. *warp*, to wrap up: Fris. *wrappe*, to wrap: a derivative from *warp*]: to cover (a thing or the person) by winding something soft and flexible around it) or to wind or fold (something soft and flexible) around a thing or the person; as, to *wrap* one's self up in a blanket; to *wrap* a thing in paper; to wind or fold together; to involve totally: N. a loose outer dress or article of clothing, for occasional use, as in carriage driving or traveling; in plu. a collective name for such articles. WRAP'PING, imp.: ADJ. designed for rolling round or covering: N. the act of one who wraps; a cover; that in which anything is rolled up; an envelope. WRAPPED, or WRAPT, pt. and pp. *răpt*. WRAP'PER, n. *-pẽr*, one who wraps; that in which anything is inclosed; an envelope; a loose upper garment. WRAPT UP, comprised; contained; wholly devoted to or dependent on. WRAPRAS'CAL, n. *-răs'kăl* [*wrap*, and *rascal*]: *familiarly*, a kind of coarse upper coat.

WRASSE, *răs*, or ROCK'-FISH: fish of the genus *Labrus*, family *Iabridæ* (q.v.) of the section having cycloid scales, *Cyclolabridæ* of Müller. The Wrasse has spiny fins, large thin scales, and an uninterrupted lateral line. The mouth is protrusible, with thick fleshy lips, folded so as to appear double. The teeth on the jaws are simple, in one or more rows; the lower pharyngeal bones are completely fused together and have broad grinding teeth. The form is somewhat perch-like, with the back more

straight. There is a single long dorsal fin, the spines of the anterior portion of which are surmounted by short membranous filaments, the posterior portion having short and split rays. The ventral fins are under the pectorals. The colors are generally very brilliant. The genus *Labrus* contains numerous species, abounding chiefly in tropical seas. They usually frequent rocky shores and are in small shoals, often hiding under seaweeds. They feed on crustaceans, mollusks, and marine worms. They are often caught by bait intended for other fish, but their flesh is not esteemed. The Ballan Wrasse (*L. bergylta* or *maculatus*) is one of the most common British species: it attains a length of about 18 in. and a weight of more than 3 lbs. It is bluish green, paler on the belly, all the scales margined more or less broadly with orange-red, the blue prevailing in some specimens, and the orange in others. The Cook Wrasse (*L. mixtus* or *variegatus*) is frequent on s. shores of England. Its prevailing color is orange, striped transversely with blue, particularly in the male, the colors of the sexes differing so much that the female has often been described as a distinct species and is generally known as the Red Wrasse. The Corkwing (*Crenilabrus melops* or *tinea*) is about 6 in. long, and of greenish-blue color, varied with yellow. The colors quickly fade after the fish is taken out of the water.—Our Atlantic coast species of the family are the Cunner, Blue Perch, or Bergall (*Ctenolabrus adspersus*), brownish blue with brassy tinge, from Newfoundland to Virginia, common on rocky shores; and the well-known Tautog (*Hiatula onitis*).

WRATH, n. *râth* [AS. *wrath*, wroth: Dut. *wreed*, sharp of taste, rough: Sw. *wrede*, wrath: Dan. *vred*, angry]: violent anger; fury; indignation; the effects of great anger; in *Scrip.*, just punishment of an offense or crime. Wrath'ful, a. *-fûl*, very angry; greatly incensed; furious; springing from wrath. Wrath'fully, ad. *-lĭ*. Wrath'fulness, n. *-nĕs*, the state of being wrathful. Wrath'less, a. *-lĕs*, without wrath.—Syn. of 'wrath': choler; ire; rage; anger; vengeance; passion; resentment.

WRATTISLAW, *răt'ĭs-lâ*, Arthur Henry: English scholar: b. England of Bohemian parentage about 1822; d. 1892. He was graduated from Cambridge in 1844, was headmaster of Felstead grammar school 1849-57, and of that at Bury St. Edmonds 1857-79, and was vicar of Manorbier, Pembrokeshire, Wales, 1879-87. He was the leading Slavonic scholar of his day in England, and among the important of his publications are: *Lyro Czecho-Slavonska* (1849); *The Queen's Court MSS. with Other Ancient Bohemian Poems* (1852); *Life, Legend, and Canonization of St. John Nepomuk* (1873); *Native Literature of Bohemia in the 14th Century* (1878); *Sixty Folk Tales from Slavonic Sources* (1889).

WRAWL, v. *rawl* [imitative word]: in *OE.*, to cry as a cat.

WRAXALL, *răk'sal*, Sir Nathaniel William: English historian: b. Bristol, 1751, Apr. 8; d. Dover, Kent, 1831, Nov. 7. He was in the East Indian Civil Service 1769-72, and during the course of some seven years of foreign travel was a confidential agent of Queen Caroline Matilda of Denmark to her brother George III. (1774-5). He published *Cursory Remarks Made in a Tour* (1775); *Memoirs of the Valois Kings* (1777); *History of France from Henry III. to Louis XIV.* (1795); *Memoirs of the Courts of Berlin, Dresden, Warsaw, and Vienna* (1799), and the famous *Historical Memoirs of My Own Time, from 1772 to 1784* (1815). For a libel in the last on Count Woronzov, Russian envoy to England, Wraxall was fined $2,500 and sentenced to six months' imprisonment. He is an amusing writer, but his veracity has been many times questioned. He sat in Parliament for 14 years from 1780 and was knighted in 1813. Consult his *Posthumous Memoirs*, continued from 1784 to 1790 (1836).

WREAK, v. *rēk* [Goth. *vrikan*, to pursue: AS. *wrecan*, to give effect to, to wreak, to revenge: Icel. *reka*, to thrust, repel: Ger. *rächen*, to avenge: connected with Wrack 1]: to execute; to inflict for the purpose of vengeance; to revenge, as to *wreak* a wrong (Shak.): N. in *OE.*, vengeance; passion; a furious fit. Wreak'ing, imp. Wreaked, pp. *rēkt*. Wreak'ful, a. *-fûl*, in *OE.*, revengeful; angry.

WREAKLESS, a. *rēk'lĕs:* an old and erroneous spelling of Reckless.

WREATH, n. *rēth* [Dan. *vride;* Sw. *wrida*, to wring or twist: AS. *wræth*, a twisted band; see also Writhe]: something curled or twisted; a garland; a chaplet: V. in *OE.*, to wreathe. Wreathe, v. *rēth*, to twist; to entwine; to interweave; to encircle, as with a garland; to be interwoven. Wreath'ing, imp.: N. act of twisting or encircling. Wreathed, pp. *rēthd*. Wreathless, a. *rēth'lĕs*, without a wreath. Wreathy, a. *rēth'ĭ* or *rēth'ĭ*, resembling a wreath; twisted; curled. Wreath'en, a. *-ĕn*, intertwined; twisted; wreathed.

WREATH, in Heraldry: twisted garland of silk of different colors, otherwise called a torce, on which it has, since the 14th century, been usual to place the crest. The side-view of a wreath thus drawn exhibits six divisions, generally tinctured with the livery colors—that is, the principal metal and color of the shield. Every crest is now understood to be placed on a wreath, except when it is expressly stated to issue out of chapeau or coronet. A wreath, when represented alone, shows its circular form. A wreath is always understood to be the twisted garland of silk, unless otherwise specified; but wreaths

of laurel, oak, ivy, etc., sometimes occur. Ordinaries are occasionally wreathed, otherwise called *tortillé*, in which case they are represented as if composed of two colors, twisted as in the heraldic wreath.

WRECK, n. *rĕk* [Icel. *reka*, to cast, to drive: F. *varech*, what is driven up by the sea: Dan. *vrag;* Dut. *wrak*, shipwreck—*lit.*, that which is *cast* or *driven* ashore (see also WREAK)]: that which is cast upon the shore by the waves; the goods, broken timbers, etc., cast ashore from a ship that has been broken up or destroyed at sea, as by collision, tempest, etc.; destruction of a ship caused by its being driven on rocks or on shore by the violence of a tempest, or some similar cause; the remains of anything broken up or ruined, as a ship; ruin; destruction; a shattered condition or something in such a condition, as, 'he is a *wreck*, both physically and mentally: V. to ruin or destroy by dashing on rocks or shoals; to ruin; to suffer ruin. WRECK'ING, imp. WRECKED, pp. *rĕkt.* WRECKAGE, n. *rĕk'āj*, shipwreck; the broken-up parts and scattered cargo of a ship that has become a wreck; wrecked material of any kind. WRECK'ER, n. *-ėr*, one who plunders the goods cast on shore from a wrecked vessel; one who allures ships to destruction by exhibiting false lights and by other means for the sake of plunder; one engaged in the securing of the cargo of a wrecked vessel. WRECKFUL, a. *rĕk'fûl*, in *OE.*, causing wreck.

WRECK, v. n. *rĕk:* an obsolete form of WREAK.

WRECK, in Maritime Law: goods cast ashore by the waves after shipwreck, and left there within the jurisdiction of some country, and subject to common law. A ship also is a wreck when she is rendered unable to pursue her voyages without repairs exceeding half her value: see SHIPWRECK. A sunken vessel is not a wreck, but derelict (q.v.). In the United States, laws have been enacted by the several states bordering on the sea for the safe-keeping and proper disposition of wreck. Goods found at low-water mark, or between high and low water mark, whether resting or partly resting on the ground, are wrecks, and, if not reclaimed, belong to the owner of the shore. See SALVAGE; FLOTSAM.

WREDE, *vrā'dėh*, KARL PHILIPP, Prince of: Bavarian field-marshal: 1767, Apr. 29—1838, Dec. 12; b. Heidelberg. Belonging to a noble family, he early obtained official employment, and 1793 was elected 'civil commissary' in the Palatinate, accompanying for five years the armies of Wurmser, Duke Albert, and Archduke Charles, in Italy and Germany, and frequently sharing in military operations. In 1799 he led a body of Bavarian volunteers to join Archduke Charles; and for his distinguished conduct in that campaign he obtained, 1800, the grade of major-general. After the peace of 1800, he devoted much time and labor to the organization of the

Bavarian army; and when war was renewed, found himself at the head of the Bavarian contingent, well disciplined and thoroughly equipped, fighting side by side with his former foes the French; and he was prominent in most of the campaigns against the Austrians, Prussians, and Russians till 1813. But after the retreat from Russia, offended at some real or fancied insults, he returned to Munich, joined the anti-French party, which was headed by the queen and crown-prince; and though his intrigues were stopped by the victories of Lützen and Bautzen, he soon afterward succeeded in bringing about the treaty of 1813, Oct. 8, by which Bavaria joined the coalition against France; and before the end of the same month, he was at the head of 70,000 men. Attacked by Napoleon with an inferior force, Wrede was, after a bloody and protracted contest, defeated at Hanau. He was chosen soon afterward to command the fourth corps of Schwarzenberg's army, and, though unsuccessful in most of his petty conflicts, contributed to the successful advance on Paris. His services were rewarded 1814 by the dignities of field-marshal and prince, and by the gift of the domain of Ellingen. On the brief renewal of the contest during the 'Hundred Days,' Wrede was preparing to invade Lorraine, when the battle of Waterloo put an end to the strife. After this period, Wrede was employed on many important missions, and was charged with the pacification of Rhenish Bavaria during the revolution of 1830.

WREN, n. *rĕn* [AS. *wrenna;* Icel. *rindill,* a wren]: a small bird of the genus *Troglodytes* and family *Certhiadæ* (the creepers), having a slender, slightly curved, and pointed bill, edge of the mandibles entire; wings very short and rounded; tail short and carried erect; legs slender and rather long; plumage generally dull. Wrens are natives chiefly of the n. hemisphere. They live on or near the ground, seeking for insects and worms among low bushes and in similar situations. The House Wren (*T. aëdon*), all the plumage barred or waved with darker brown, is one of our most common and lively birds. The Winter Wren (*T. hiemalis*), s. to the United States in winter, is more reddish, and has the tail less than ¾ the length of the wing. The Carolina Wren (*Thryothorus ludovicianus*), the wings barred, otherwise clear red-brown above and pale buff below, is a fine singer; it is found n. to Pennsylvania. Of the genus *Cistothorus,* the Long-billed Marsh Wren (*C. palustris*) is abundant in reedy wet places, and the Short-billed Marsh Wren (*C. stellaris*) is somewhat rare; both have the back streaked lengthwise, the latter on the whole upper surface.

The European Wren (*T. vulgaris*), found in all parts of Europe and in n. Asia, is similar in appearance to the Winter Wren, and about the same size, 4 in. It is

found even in the arctic regions. Its song is loud and sweet. When driven from bushes, it is easily run down; and the hunting of wrens on St. Stephen's Day is an old custom in s. Ireland.

Few birds are more familiar in the United States than the house-wren (*Troglodytes aëdon*). It is about 5 in. long. The color is very uniform, reddish brown above, barred with dusky, and pale fulvous white below. It often builds its nest near houses, and in boxes prepared for it or in any convenient hole. The nests are made to fill the boxes; and to effect this a large mass of heterogeneous materials is sometimes collected. From 6 to 8 eggs constitute a brood and 2 or 3 broods are produced in a summer. The eggs are so thickly spotted with brown that they appear to be almost uniformly colored. The song is extremely rapid and vivacious as though the performer were overflowing with good spirits. The male is a very bold, pugnacious bird, readily attacking birds far larger than itself, as the bluebird and swallows, and taking possession of the boxes which they have appropriated for their nests. It even attacks cats when they approach its nests and vigorously scolds all intruders.

The winter wren (*T. hyemalis*) is our smallest species of wren, only about 4 in. long, and the ridiculous little tail is usually cocked straight up into the air. Above, the color is a rich dark brown; below it is much lighter, both regions prettily barred. The typical form inhabits most of eastern North America, the Canadas, and northernmost United States during the summer and the rest during the winter.

WREN, *rĕn,* Sir CHRISTOPHER, D.C.L.: renowned English architect: 1632, Oct. 20—1723, Feb. 25; b. East Knoyle, Wiltshire; son of Dr. C. Wren, dean of Windsor; and nephew of Dr. M. Wren, bishop successively of Hereford, Norwich, and Ely. At an early age, young Wren was placed at Westminster School, under the celebrated Dr. Busby, and while only in his 14th year was entered a gentleman commoner of Wadham College, Oxford. Here he made considerable progress in mathematical studies, and attracted the notice of the cultivators of physical science—residents or visitors—by his inventions of mathematical instruments, and his zeal and enthusiasm in experimental philosophy. In 1650 he took his degree B.A.; in 1653 M.A.—having been previously made fellow of All Souls.' He now became a member of a society at Oxford for the advancement of natural and experimental philosophy; and 1654 is spoken of by Evelyn, in his *Diary,* as 'that miracle of a youth;' also, in his *Sculptura,* as 'that rare and early prodigy of universal science.' The acquaintance thus begun ripened into a firm friendship between Wren and Evelyn.

In 1655 Wren greatly assisted in perfecting the barometer, then recently invented. In 1657 he left Oxford for London, where he became Gresham prof. of astron-

omy; but 1661, May, he returned to Oxford, as Savilian prof. of astronomy. Before leaving London, Wren, with Lord Brounker, the Hon. Robert Boyle, Mr. Bruce, Dr. Wilkins, Sir Robert Moray, and others, who used to meet together at Gresham College, had laid the foundation of the Royal Soc. Before the soc. was formally incorporated, the members felt much the absence of Wren from their meetings, and one of their first proceedings was to induce the king to lay his commands on him to perfect a design that he had in hand of a globe of the moon, and to 'proceed in drawing the shapes of little animals as they appear in the microscope.' The lunar globe was finished, much to the satisfaction of his majesty, who placed it in his cabinet of rarities. He also summoned Wren from Oxford to assist Sir John Denham with his advice on architectural subjects, the poet Denham having been appointed surveyor-gen. of his majesty's buildings, but having little knowledge of the subject.

The study of architecture had had great attention from Wren while still a very young man, notwithstanding his devotion to mathematics, astronomy, chemistry, and anatomy. In 1663, as asst. surveyor-gen., he was offered a large salary to go to Tangier, to direct the works at the mole, harbor, and fortifications; but he declined. In the same year Wren was engaged by the dean and chapter of St. Paul's to make a survey of the cathedral, with a view to repairs in that vast fabric. He accordingly drew up a very careful and elaborate account of the state of the building, with suggestions for its improvement, and with drawings and designs. All these were laid before the king; but before further steps were taken for the restoration of St. Paul's, that building was levelled to the ground by the memorable fire of 1666, and Wren became architect of the new cathedral, instead of restorer of the old. The first work actually built from a design by Wren was the chapel at Pembroke College, Cambridge, 1663. But in the same year he designed the Sheldonian Theatre at Oxford, begun 1664, finished 1669. In 1664 Wren designed also some valuable additions to the buildings at Trinity College, Cambridge; particularly the beautiful w. quadrangle, Nevile's Court. To this he added, 1666, the Library of Trinity College, said by Gwilt to be 'one of his finest productions, and one with which he himself was well satisfied. It consists of two orders; a Doric arcade below, open to a basement supported by columns, which has a flat ceiling. . . . The principal story is decorated with three quarter columns of the Ionic order, well proportioned.'

In 1665 Wren visited Paris, where he made the acquaintance of Bernini, architect of the Louvre, and of other distinguished men. In the following year he returned, to find the Royal Soc. earnestly engaged in searching out the causes of the great plague, so soon to be succeeded by the great fire which laid London in

ashes. This disaster at once opened a wide field for Wren's genius. He formed a plan and drew designs for the entire rebuilding of the metropolis, embracing wide streets, magnificent quays along the banks of the river, and other well-considered improvements. In rebuilding London, however, few of Wren's recommendations were adopted. He was chosen to be the architect of new St. Paul's, one of the finest non-Gothic cathedrals in the world; besides which he designed more than fifty other churches instead of those destroyed by the fire. The great Church of St. Paul's, on the model of St. Peter's at Rome, was begun 1675, and completed 1710, when the last stone was laid upon the lantern by the architect's son, Christopher. See ST. PAUL'S CATHEDRAL. Of Wren's other city churches, most notable are St. Michael's, Cornhill; St. Bride's, Fleet street (with graceful spire); St. Stephen's, Walbrook, with plain exterior but very elaborate interior—illustrating his judicious method of applying money, when the sum was limited, to some one part or feature (e.g., a spire or a scheme of internal decoration), instead of losing it by hopeless dispersion among all parts of a great structure. Wren built also the Royal Exchange, London, 1667; Custom-house, London, 1668; Temple Bar, 1670; the Monument, 1671-77; the College of Physicians, 1674-98; the Royal Observatory, Greenwich, 1675; the Gateway Tower, Christ-Church, Oxford, 1681-2; Chelsea Hospital, 1682-90; Ashmolean Museum, Oxford, 1683; Hampton Court, 1690; Morden College, Blackheath, 1692; Greenwich Hospital, 1696; Buckingham House, 1703; Marlborough House, 1709; the towers at the w. front of Westminster Abbey, 1713; besides the unfinished palace of Winchester, 1683.

In 1672 Wren received knighthood. In 1674 he married Faith, daughter of Sir John Coghill, by whom he had a son, Christopher, who survived him; and his wife dying, he married, 1679, Jane, daughter of Viscount Fitzwilliam, by whom he had a son and a daughter. In 1680 Wren was elected pres. of the Royal Soc. In 1684 he was made comptroller of the works at Windsor Castle; and 1685 he was elected grand master of the order of Freemasons. He was also elected a member of the house of commons for New Windsor 1689, and being unseated on petition, was immediately re-elected for the same place. In 1698 he was appointed surveyor-gen. of the works and repairs at the Abbey of St. Peter, Westminster; and in the same year was again elected grand master of the Freemasons. Wren died in his chair after dinner, aged 90 years, and was buried in St. Paul's Cathedral, where the appropriate inscription, 'Si monumentum requiris, circumspice,' marks his tomb. During his declining years he was treated with neglect and even injustice by the court of England; 'one Benson' was appointed by George I. to supersede him in the office of surveyor-gen.; and some private individuals carped at his works in a malevo-

lent spirit. Steele, however, vindicated the fame of his friend in the *Tatler,* in which Wren is introduced in the character of Nestor; and few have been found since that time hardy enough to call in question the well-merited reputation of Sir C. Wren as a distinguished architect, mathematician, and scientific observer. As an architect, his power was in the constructive rather than the artistic departments. His grace and fertility of invention in designing steeples have been greatly praised.

WRENCH, n. *rĕnch* [OE. *wrench,* a trick, a sharp turn: Ger. *rank,* intrigue, trick, crookedness: AS. *wrence,* guile, deceit: allied to WRING]: a sudden or violent twist or turn; a sprain; a tool for forcibly turning bolts and nuts: V. to force by twisting or pulling; to sprain; to distort. WRENCH'ING, imp. WRENCHED, pp. *rĕncht.*

WREST, v. *rĕst* [AS. *wræstan,* to twist, to wrench: Icel. *reista;* Dan. *vriste,* to wrest, to wrench: prov. Ger. *riest,* the wrist (see also WRITHE)]: to twist or extort by violence; to force from by violent twisting; to distort; to turn from its natural meaning: N. distortion; violent pulling and twisting; an instrument like or used like a wrench; a key or hammer used in tuning a stringed instrument; key for tuning a harp. WREST'ING, imp. WREST'ED, pp. WREST'ER, n. *-ėr,* one who wrests.

WRESTLE, v. *rĕs'sl* [AS. *wræstlian,* to wrestle—from *wræstan,* to twist: O. Dut. *wrastelen,* to wrestle: the frequentative of *wrest*]: to grapple with another and endeavor to throw him; to struggle for the mastery by closing with and endeavoring to throw one's adversary; to strive; to struggle; to contend with: N. a wrestling match. WREST'LING, imp. *-lĭng:* N. the act of one who contests in a trial of strength; an athletic exercise, in which two persons grapple and strive to throw each other; struggle; contention. WREST'LER, n. *-lėr,* one who wrestles or contends with another in a trial of strength, each contestant grappling with and endeavoring to throw the other either by main strength or by adroit swinging, twisting, etc.

WREST'LING: gymnastic exercise between two contestants, interlocked usually face to face, who strive to throw each other to the ground. It was in high favor with the ancients. The Greeks placed it among the most honorable of the Olympic, Isthmian, and other games; and it was encouraged among the Romans. There are sculptures from Egypt and Nineveh that show the great antiquity of the game. The ancient practice was essentially like the modern, the contestants holding each other in firm grasp, pushing, pulling, interlocking legs, lifting when in closer movements, and in general seeking to control the opponent's legs so as to produce a fall. But the ancients also resorted to means not approved in a fair trial of strength, such as throttling and butting. In the middle ages there are records of matches, such as that in

1222, when representatives of Londoners were victors in contests with the men of Westminster. The prize was sometimes a ram or a cock.—A number of English systems of wrestling have been recognized, and have been to some extent introduced in the United States. In s.w. England the contestants take hold of any part of a strong jacket; for a fair fall, both shoulders and one hip, or both hips and one shoulder, must be on the ground; and the throw must be flat on the back, with no intermediate position of fall, before the contest is decided. In Lancashire the wrestlers seize any part of the body. In the Cumberland and Westmoreland system the contestants stand chest to chest, chins upon right shoulders, each man joining his hands behind his adversary, the right arm of each man passing under the left of the other. If the hold is lost, the game is lost; if both fall simultaneously, the game is renewed, the decision resting on the fall of one before the other. The system includes a variety of expedients for upsetting the competitor, such as that called the 'buttock,' which is twisting so as to make the hip a fulcrum against the other man's body, then by bending lift him from his feet; the 'cross-buttock,' a further twist, bringing the back against his body, and bending as in the first case; the 'back-hank,' in which left leg is passed inside around left leg, and the pull is backward; the 'back-heel,' putting left heel behind the opponent's right heel, forcing his leg up forward, and throwing him backward; the 'left-leg hipe,' and the 'right-leg hipe,' swinging him around, and striking the outside of the thigh against the inside of his; and the 'left-leg stroke' or 'right-leg stroke,' common among boys and unscientific wrestlers, which is simply striking the adversary's leg out on one side while his body is swung in the other direction. No seizing hold of arms, legs, or thighs is allowed in this game, and of course all kicking is ruled out from all civilized practice. The 'catch hold, first down to lose,' is the least objectionable game; the wrestlers must not grip below the waist, and the one who touches ground first with any part of his body is the loser. The boys' game is the front hold, otherwise called square hold, hands on opposite upper arms, and the effort being to swing the opponent suddenly one way while his leg on the opposite side is pushed out, or else, more effectively, to get one leg behind the opposite one, and throw backward. There is also a game of 'side-hold,' both parties facing one way, and each with an arm around the other's waist; in this the effort is simply to swing suddenly, or, more effectively, to get the knee behind that of the other wrestler, and throw backward.—Wrestling is not the most desirable form of exercise, or of trials of strength. Life-long injuries have resulted, and in some cases immediate death from falls.—See PUGILISM.

WRETCH, n. *rĕch* [AS. *wrœcca*, an exile, a miserable

man; *wrecan,* to persecute (see also WREAK)]: a worthless degraded creature; one sunk in the deepest distress; an outcast; a person sunk in vice; formerly sometimes used as a word of tenderness or fond endearment; ironically in pity, etc., somewhat as 'body,' 'creature,' and 'thing' are now used. WRETCH'ED, a. very miserable; unhappy; sunk in deep distress; very poor, mean, or worthless; contemptible. WRETCH'EDLY, ad. *-lĭ,* meanly; poorly. WRETCH'EDNESS, n. *-nĕs,* extreme misery or unhappiness.

WREXHAM, *rĕks'sam:* municipal and parliamentary borough in Denbighshire, and one of the most important towns in N. Wales; 11 m. s.s.w. of Chester, 201 m. from London by rail; on an affluent of the Dee. The town is handsome and lively, and the church, a fine edifice in Perpendicular Gothic, was built about 1470, though its tower, 135 ft. in height, was built 1506-20; this tower has been styled 'one of the seven wonders of Wales.' This church contains a monument and two medallions by Roubilliac. In the vicinity are several collieries, which, with lead mines, iron-works, paper-mills, and breweries, give employment to the inhabitants. Wrexham has important markets and fairs, one of which, for 14 days in March, is attended by traders of all kinds and from great distances.—Pop. (1871) 8,576; (1881) 10,978; (1891) 12,552; (1901) 14,966.

WRIGGLE, v. *rĭg'gl* [Low Ger. *wrikken,* to work a thing loose by shaking to and fro: Dut. *wriggelen,* to wriggle: Dan. *vrikke,* to wriggle (see also WRY)]: to move to and fro with short turns; to twist to and fro or back and forth; to put the body into a quick shifting motion; to insinuate or gain by low contemptible means: N. a movement as from side to side, with short twists: ADJ. in *OE.,* pliant; flexible. WRIG'GLING, imp. *-glĭng:* N. the act of one who wriggles. WRIGGLED, pp. *rĭg'gld.* WRIG'GLER, n. *-glĕr,* one who wriggles.

WRIGHT, n. *rīt* [AS. *wyrcan,* to work; *wyrhta,* a workman (see also WORK)]: a workman; one engaged in some mechanical occupation; in *Scot.,* a carpenter; used chiefly in compounds, as *shipwright, millwright.*

WRIGHT, *rīt,* ARTHUR WILLIAMS, PH.D.: professor of experimental physics: b. Lebanon, Conn., 1836, Sep. 8. He graduated at Yale, A.B. 1859, PH.D. 1861; studied law, and was admitted to the bar 1866; was tutor at Yale 1863-68; studied physical science at Heidelberg and Berlin 1868-9; became prof. of physics and chem. at Williams College 1869; returned to Yale 1872, as prof. of molecular physics and chem.; took charge 1885 of the Sloane Phys. Laboratory, whose construction he had supervised; and from 1887 was styled prof. of experimental physics. He was consulting specialist to the U. S. signal service bureau 1881-86; fellow of the Royal Astronomical Soc. from 1879; member of the National

Acad. of Sciences from 1881; and one of the revisers of Webster's Dictionary 1862-64 and 1885-88. He made the earliest observation of the electric shadow 1870-1; investigated ozone 1872-74, and the polarization of the zodiacal light; made the earliest study of the gases in stony meteorites; devised a method 1877 of using the discharge of electricity in a vacuum to deposit the metal of the electrode in transparent films on glass; assisted in observing the total solar eclipse 1878, detecting and measuring with a special form of polarimeter the polarization of the light of the corona; and similarly investigated 1881-83 the light of several comets and of the moon. His device for a standard barometer, and that for distilling mercury in vacuo, have been adopted by the U. S. signal service.

WRIGHT BROTHERS: aeronauts: inventors of the first practical heavier-than-air flying machines; WILBUR, b. near Millville, Ind., 1867, Apr. 16; ORVILLE, b. Dayton, Ohio, 1871, Aug. 19. They are the sons of Bishop Milton Wright (United Brethren in Christ) and his wife Susan Koerner. The boys received such education as the public and high schools of their vicinity afforded, and, being of an investigating and inquiring turn of mind, devoted themselves to solving the problems of mechanical flight. The first successful attempt was made at Kitty Hawk, N. C., in 1903, and the first long distance flight was made at Dayton, Ohio, in 1905. These tests determined the correctness of the principle on which the machines were constructed, and the next years were spent in perfecting details of machinery and acquiring facility in handling. During a flight at Ft. Meyer, Va. (1908), in preparation for a test by the U. S. Engineers, Orville was seriously injured and it was not until early in 1909 that he again attempted the sailing of an aeroplane. In 1908, Wilbur went to France, and astonished the world with the perfection of his machine and the precision and exactness of his manipulation. He was the guest of crowned heads and the admiration of the scientific world for more than two years, at the end of which the mastery of the air by man had ceased to be a subject of theoretical discussion, and become a commercial reality.

WRIGHT, *rīt*, CARROLL DAVIDSON, A.M., LL.D.: statistician: b. Dunbarton, N. H., 1840, July 25; d. 1909, Feb. 21. He left the study of law to enter the army; became col. of the 14th N. H. vols. 1864, and acting adjt.gen. on the staff of Gen. Sheridan; resigned 1865, and was admitted to the bar the same year; removing to Mass., was state senator 1871-2, chief of the state bureau of statistics of labor 1873-88, supervisor of U. S. census in Mass. 1880, commissioner to investigate the public records of Mass., and chief of the decennial state census 1875 and 85; and since 1885 was commissioner of the bureau of statistics of labor, till 1903 in the dept. of the

interior. In 1902, Apr., he was made president of the Collegiate department of Clark University, and in Oct. following was a member and recorder of the Coal Strike Commission. He published a large number of important reports and special works of a statistical character of great value.

WRIGHT, CHAUNCEY: philosophical writer: 1830, Sep. 20—1875, Sep. 12; b. Northampton, Mass. He graduated at Harvard 1852, became a computer for the *Nautical Almanac*, contributed to periodicals able papers on mathematics and physics, was ultimately led to give special attention to advanced scientific and philosophical studies, and gave the fruits of his work in a series of very able essays. He gave a course of lectures on psychology at Harvard 1870, and was instructor in mathematical physics 1874-5. He was rec. sec. of the Amer. Acad. of Arts and Sciences 1863-70. His collected essays, with memoir by Charles Eliot Norton, were published as *Philosophical Discussions* (1877).

WRIGHT, ELIZUR: 1804, Feb. 12—1885, Nov. 21; b. S. Canaan, Conn.: methematician. He graduated at Yale College 1826; was prof. of mathematics and nat. philosophy in Western Reserve College 1829-33; became sec. of the Amer. Anti-Slavery Soc. 1833; was editorially connected with anti-slavery periodicals in New York and Boston 1834-52; edited the *Railroad Times* and invented a spike-making machine, water-faucet, and improved pipe coupler 1853-58. About 1850 he began giving much attention to the insurance business; 1853 published *Life Insurance Valuation Tables;* 1858 was instrumental in securing the creation of a Mass. state insurance commission; and till 1866 was the commissioner. After that date he was consulting actuary for several life insurance companies. Wright devised the accumulation formula; invented the arithmeter for multiplying and dividing; secured the adoption by the Mass. legislature of the Non-Forfeiture Insurance Act of 1861, and its substitute 1880; was twice pres. of the National Liberal League; actively promoted American forestry; and published a number of poetical, mathematical, and historical works.

WRIGHT, FANNY. See D'ARUSMONT, FRANCES.

WRIGHT, GEORGE FREDERICK, A.M., D.D., LL.D.: Congregational theologian, and geologist; b. Whitehall, N. Y., 1838, Jan. 22. He graduated from Oberlin College (1859) and Theol. Seminary (1862), having been 5 months a private soldier in the civil war while a student. He was Congl. pastor in Bakersfield, Vt., 1862-72, and at Andover, Mass., 1872-81, prof. of New Testament language and literature in Oberlin 1881-92, prof. of the harmony of science and religion 1902-7, and prof. emeritus since 1907, having retired on a Carnegie pension. Becoming interested in geology, he assisted for

a time in the Pennsylvania survey 1881; tracing the terminal moraines of the glacial age from Long Island through that state and westward, and publishing *The Glacial Boundary in Ohio, Indiana, and Kentucky* (1884). From 1884-1892 he was on the staff of the U. S. geological survey, spending his summer vacations in investigations of glacial phenomena in the United States and in the n.w. as far as Alaska. He has been called to lecture on the subject before learned societies, and has published *The Ice Age in North America* (1889), and *Supplementary Notes* to the 3d edition of the same (1891). His other works include *The Logic of Christian Evidence* (1880); *Studies in Science and Religion* (1882); *The Relation of Death to Probation* (1882); *The Divine Authority of the Bible* (1884); *Charles Grandison Finney* (1891); etc. Since 1884, when the *Bibliotheca Sacra* was removed from Andover to Oberlin, he has been its principal working editor.

WRIGHT, Henry Clarke: reformer: 1797, Aug. 29—1870, Aug. 16; b. Sharon, Conn. He was among the early anti-slavery agitators and lecturers, and prominent among the speakers at the anniversay meetings of the Amer. Anti-Slavery Soc. in New York, which did so much to arouse the public on the question of slavery. He was also an advocate of peace and of socialism. Later he became a spiritualist, and defended this belief as earnestly as he had opposed slavery. He was the author of *Man-killing by Individuals and Nations Wrong; A Kiss for a Blow; Defensive War proved to be a Denial of Christianity;* and *The Living Present and the Dead Past.*

WRIGHT, Horatio Governeur: soldier: b. Clinton, Conn., 1820, Mar. 6; d. Washington, D. C., 1899, July 2. He graduated at West Point 1841; served in the engineers, and as asst. prof. of French, later of engineering, 1842-44; was 1st lieut. 1848; superintended construction of forts in Fla.; became capt. 1855; and till the civil war was on duty at Washington as asst. to the chief engineer. He took part in constructing the defenses of Washington, in the battle of Bull Run, and in organizing the Port Royal expedition; and accepted a major's commission in the engineers 1861, Aug., which in the preceding May he had declined in the infantry. He was made brig.gen. of vols. Sep. 15; became maj.gen. of vols. 1862, July 18; successively commanded the dept. of the Ohio, the dist. of Louisville, and a division of the Army of the Potomac. He succeeded Gen. John Sedgwick, 1864, May, as commander of the 6th corps; made an effective movement from Petersburg to check and repel Early's attempt on Washington; rendered distinguished service at Cedar Creek, 1864, Oct. 19; and was the first to break the strong lines at Petersburg, 1865, Apr. 2. He was made lieut.col. U. S. army 1865, Nov. 23; col. 1879, Mar. 4; brig.gen. 1879, June 30; and was retired 1884, Mar. 22.

WRIGHT, JOHN HENRY, A.M., LL.D.: American classical scholar: b. Urumyah, Persia, 1852, Feb. 4. He was graduated from Dartmouth in 1873, and studied at Leipsic, 1876-8. He was associate professor of Greek at Dartmouth 1878-86, professor of classical philology at Johns Hopkins 1886-7, and since 1887 professor of Greek at Harvard and dean of the graduate school from 1895. He has been editor-in-chief of the *American Journal of Archæology* from 1897, and has edited several important works.

WRIGHT, JOHN VINES: American jurist: b. Purdy, Tenn., 1828, June 23; d. 1908, June 12. He was admitted to the bar in 1852 and was a member of congress in 1855-61. During the civil war he served in the Confederate army, first as captain and later as colonel of the 13th Tennessee regiment; until elected to the Confederate congress, in which body he remained till the fall of the Confederacy in 1865. He then became a judge of the circuit court and afterward chancellor and judge of the Tennessee supreme court. In 1886-90 he was chairman of the Northwest Indian Commission and concluded many treaties with Indians. He was defeated for governor of Tennessee in 1880.

WRIGHT, JOSEPH: American artist: b. Bordentown, N. J., 1756, July 16; d. New York 1793. He obtained his art education in England and Paris, in 1783 returned to America, and in that year painted a portrait of Washington. Subsequently he executed another for the Comte de Solms, and still later a miniature profile. Among his other portraits were those of Jay and Madison. In 1792 he was made first draughtsman and die-sinker in the mint newly established at Philadelphia. He was the designer of the first coins and medals struck by the national government.

WRIGHT, JOSEPH: English philologist: b. 1855, Oct. 31. From 1891 to 1901 he was deputy-professor of comparative philology in the University of Oxford, and in 1901 was made professor. Among his publications are a rendering of Brugmann's *Grundriss der vergleichenden Grammatik der Indogermanischen Sprachen*, Vol. I.; textbooks of Middle and Old High German, and a grammar of the dialect of Windhill in the West Riding of Yorkshire. But he is known for his *English Dialect Dictionary*, begun in 1896, and completed in 1905, and his *English Dialect Grammar* (1905).

WRIGHT, JULIA MCNAIR: American author: b. Oswego, N. Y., 1840, May 1; d. Philadelphia, Pa., 1903, Sep. 2. She was married in 1859 to Rev. W. J. Wright and published numerous temperance and anti-Roman Catholic stories, among which were *Almost a Nun; Priest and Nun; The Gospel in the Riviera; The Heir of Athole.*

WRIGHT, LUKE E., LL.D.: diplomatist: b. Memphis, Tenn., 1847; son of a former justice of that state. He

received a private education, and was admitted to the bar as a practicing attorney in his native city. During the yellow fever epidemic in Memphis, 1878, he was active in relief work. He was attorney-general of Tenn., 1880-1888. In 1900 Wright was appointed a member of the Philippine Commission; commissioned governor in 1904, and under the bill passed by Congress, 1905, he was the first American to receive the title of gov.gen. of the Philippines. The U. S. having raised their legations to the rank of embassies, he was appointed in Jan., 1906, first American ambassador to Japan. Hamilton college bestowed upon him the degree of LL.D. in 1903. He resigned the Japanese embassy to become secretary of war in Pres. Roosevelt's cabinet, 1908, July 1.

WRIGHT, MABEL OSGOOD: American writer on nature; b. New York 1859. She was married in 1884 to J. O. Wright and has made her home in Fairfield, Conn. She has edited *Bird Lore,* with F. M. Chapman, and has published *The Friendship of Nature,* a series of outdoor studies (1894); *Birdcraft,* a book on New England birds (1895); *Tommy-Anne: A Natural History Story* (1896); *Citizen Bird,* a book for beginners (1897); *The Dream Fox Story Book* (1900); *The Flowers and Ferns in their Haunts* (1901); *Dogtown* (1902); *People of the Whirlpool* (1903); *The Woman Errant* (1904); *At the Sign of the Fox* (1905); *The Garden, You and I* (1906); *Gray Lady and the Birds* (1907); etc.

WRIGHT, MARCUS JOSEPH: American soldier, brother of J. V. Wright (q.v.): b. Purdy, Tenn., 1831, June 5. He studied law, was admitted to the bar and practiced his profession in Memphis till the outbreak of the civil war, when he entered the Confederate army as lieutenant-colonel of a Tennessee regiment. He was promoted brigadier-general in 1862 and was wounded at Shiloh. He has written *Life of Gen. Winfield Scott* in *Great Commander* series (1894); *Life of Governor William Blount;* etc. Since 1878 he has been agent of the War Department for collections of military records.

WRIGHT, MARY TAPPAN: American novelist: b. Steubenville, Ohio, December 1851. She was a daughter of Eli Tappan, a president of Kenyon College, and in 1879 was married to John Henry Wright (q.v.). Her work in fiction, which displays much keen characterization and charm of style, includes: *A Truce and Other Stories* (1895); *Aliens* (1902); *The Test* (1904); *The Tower* (1906); etc.

WRIGHT, SILAS: statesman: 1795, May 24—1847, Aug. 27; b. Amherst, Mass. He graduated at Middlebury 1815; studied law, and practiced in Canton, N. Y., where he was county surrogate and held town offices. He was elected to the state senate by democrats 1823, serving 4 years; was a conspicuous opponent of the canal policy of De Witt Clinton, and advocated the ideas of

economical state finance to which he usually adhered thereafter. In 1827 he was appointed brig.-gen. of militia. He was a member of congress 1827-29, where he supported the protective tariff of 1828, also a motion looking to the abolition of slavery in the Dist. of Columbia. For 4 years from 1829, he was comptroller of New York; and United States senator 1833-44. He served on the finance committee, defended the Force Bill, the Clay compromise, and the removal of deposits from the United States Bank, the rechartering of which institution he opposed, opposing also the distribution of surplus revenues among the states. He advocated Van Buren's independent treasury plan of 1840, as a measure or security instead of depositing public moneys in favorite banks; and he opposed the annexation of Texas, though it is said that he voted for it. He aided in reducing all tariff duties, and his last speech in the senate was against the tariff. From a real or politic spirit of economy, he denounced the franking privilege. He contended 1844 that interest should be added in refunding the fine of Gen. Jackson; but 1841 he made a speech against allowing the widow of Pres. Harrison the first full year of her husband's salary, and went so far as to criticise the president's hotel bills. Under Tyler it is said that Wright was offered a place on the supreme bench, also in the cabinet. Of Martin Van Buren he had always been a friend and adherent since he was a law-student; and when Van Buren was dropped for Polk in the presidential nomination of 1844, the supporters of Polk sought to placate those of Van Buren, in order to save the vote of the state of New York; and therefore the convention gave a nearly unanimous vote to Wright for vice-president; but this he peremptorily declined, lest his friends should seem to have required his nomination as a price for selling themselves to the Polk party. He declined President Tyler's offer of the chief-justiceship. Resigning from the senate 1844, Dec., he was governor of New York until 1847, and, while governor, voted an appropriation for improving the state canals; and he called out the military to suppress the anti-renters in Delaware co. Although he had become governor by a majority of more than 10,000, he was defeated for re-election by a still greater majority in the campaign of 1846. The result has been attributed largely to the presidential aspirations of the sec. of war, William L. Marcy, in conjunction with that of others, and with the southern interest, in order to make possible Wright's candidacy for the presidency two years later. He survived this reverse less than a year; meanwhile he wrote in favor of the Wilmot Proviso (q.v.), also for expenditures to improve the lake harbors. He retired to his farm in Canton, where he dressed and worked like a farmer, living in rustic simplicity. His last writing was an address for the State Agricultural

Society. He died of apoplexy. A monument was erected to him by his fellow-citizens at Canton; and another, with a medallion bust by Palmer, at Weybridge, Vt. Contrary to slanderous reports, it appears that Wright was a temperate man. He was dignified, affable, and kindly; and was esteemed by many of his associates as a man of personal and political integrity. Yet there is no doubt that he was, like other great men of his time, a partizan; and that he was versed, if not always implicated, in all the methods of the 'Albany regency,' so notable for its artful political scheming. The turning of De Witt Clinton, the creator of the Erie canal, out of his last compensating office as canal commissioner, has been by some attributed to Wright; it is said that 'he sought to make the people's party openly support Mr. Clinton, or to cause a breach between this party and Clinton's friends, with the end of electing Mr. Crawford president'—a Georgian of the Virginia school. This, if true, was far from the Cato-like character ascribed to Wright, and was at the same time inconsistent, as were some other acts of his, with steadfast anti-slavery principle. It should be remembered, however, that Wright never claimed to be a steadfast anti-slavery man: he chose and avowed the middle course—not attacking slavery where it lay intrenched within the safeguards of the constitution, but sternly refusing to extend it to new territory. If he had lived, however, he would doubtless have followed Van Buren into the free-soil movement, and probably with more sincerity and persistency.—See Jenkins's *Life;* Hammond's *Life and Times;* and Gillett's *Democracy in the United States.*

WRIGHT, THOMAS: English antiquary and historian: 1810, Apr. 21—1877, Dec. 23; b. near Ludlow, in Shropshire. He was educated in the grammar school of that town, and at Trinity College, Cambridge, where he took his degree B.A. 1834, and subsequently M.A. While at the university he contributed to *Fraser's Magazine*, the *Gentleman's Magazine*, the *Literary Gazette*, and other periodicals. In 1836 he came to London, and began the career of a man of letters; and from that time till his death he was continually before the public as author, editor, or translator. In 1837 he was elected a fellow of the Society of Antiquaries; and in the following year published his first considerable work, *Queen Elizabeth and Her Times* (2 vols. 8vo). In this year also he was one of the two founders of the Camden Society, for which he edited various works. In 1843 Wright, with his friend, Roach Smith, founded the British Archæological Association. Wright was elected 1842 corresponding member of the Institute of France, an honor never before attained by one so young: he was a member also of the Society of Antiquaries of France, of the Ethnological Society of Paris, of the Royal Society of North-

ern Antiquaries of Copenhagen, and of other learned societies.

Wright's works are said to exceed 100 volumes in number, including translations and works edited for societies; among these works are the following: *Biographia Britannica Literaria* (2 vols., Anglo-Saxon period 1842, Anglo-Norman 1846); *Essays on Subjects connected with the Literature, Popular Superstitions, and History of England in the Middle Ages* (2 vols. 1846); *The Archæological Album, or Museum of National Antiquities—the Illustrations by F. W. Fairholt* (1845); *England under the House of Hanover, Illustrated from the Caricatures of the Day* (2 vols. 1848); *Narratives of Sorcery and Magic* (2 vols. 1851); *The Celt, the Roman, and the Saxon: a History of the Early Inhabitants of Britain down to the Conversion of the Anglo-Saxons to Christianity* (1852, 2d ed. 1861); *Dictionary of Obsolete and Provincial English* (2 vols. 1857); *History of France* (3 vols. 1856-62). The following volumes form part of the series of works published, under the direction of the master of the rolls, in illustration of the mediæval history of England: *Les Cent Nouvelles Nouvelles* (2 vols. 1858), being a collection of mediæval tales from the only known manuscript of the same, discovered by Wright in the library of the Hunterian Museum, Glasgow; *Essays on Archæological Subjects* (2 vols. 1861); *History of Domestic Manners and Sentiments in England during the Middle Ages, with Illustrations by F. W. Fairholt* (1861); *A History of Caricature and Grotesque in Literature and Art, with Illustrations by F. W. Fairholt* (1865).

WRIGHT, WILLIAM, PH.D., LL.D., D.C.L.: English orientalist: 1930, Jan. 17—1889; b. Bengal, India. He was educated at the universities of St. Andrews and of Halle; was professor of Arabic in University College, London, 1855, and Trinity College, Dublin, 1856-61; assisted in the British Museum 1861; keeper of MSS. in the same 1869; and professor of Arabic at Cambridge 1870 until his death. Besides extensive catalogues of MSS., and editions of Arabic writings, he published the *Book of Jonah in Four Semitic Versions* (1857); a revised *Caspari's Grammar of the Arabic Language* (1859-62); *Contributions to the Apocryphal Literature of the N. Test.*, from Syriac MSS. (1865); *The Homilies of Aphractes, the Persian Sage* (1869); *The Apocryphal Acts of the Apostles*, from Syriac MSS. (1871); *Fragments of the Homilies of Cyril of Alexandria on the Gospel of St. Luke* (1874); and translations of the *Chronicle of Joshua Stylite* (1882) and the *Book of Kalilah and Dimnah* (1884).

WRIGHT, WILLIAM ALDIS: English scholar: b. 1836. He was a contributor to Smith's *Dictionary of the Bible* (1860-3), secretary to the Old Testament Revision Com-

pany in 1870-85, and from 1868, the year of its establishment, editor of the *Journal of Philology*. In 1888 he became vice-master of Trinity College, Cambridge. With W. G. Clark (q.v.), he collaborated on the *Cambridge Shakespeare* (1863-6) and the *Globe* edition of Shakespeare's complete works (1864). Among his other publications are editions of: the *Letters and Literary Remains of Edward Fitz-Gerald* (1889); of the *Facsimile MSS. of Milton's Minor Poems* (1899); *Fitz-Gerald's Miscellanies* (1900); *More Letters of Edward Fitz-Gerald* (1901); *Literary Remains of Edward Fitz-Gerald* (1902-3); and *Milton's Poetical Works* (1903).

WRIGHT, William Burnet, D.D.: American Presbyterian clergyman: b. Cincinnati, Ohio, 1838, Apr. 15. He was graduated from Dartmouth in 1857, was four years pastor of the South Congregational Church, Chicago; 20 years pastor of the Berkeley Street Church, Boston, and three of the First Congregational Church, New Britain, Conn., and subsequently of the Lafayette Avenue Presbyterian Church, Buffalo, prior to 1901. He has published *Ancient Cities from the Dawn to the Daylight* (1887); *The World to Come* (1887); *Master and Men* or *The Sermon on the Mountain Practised on the Plain* (1894); etc.

WRIGHTIA, *rī'tĭ-a:* genus of plants of nat. order *Apocynaceæ,* containing some of the greatest twining shrubs of the E. Indies, such as, attaching themselves in the first instance to trees for support, become themselves at last of tree-like thickness, as well as height, and kill the supporting trees by their choking embrace. The corolla is salver-shaped, with scales in its throat: the fruit consists of two erect follicles. The leaves are simple, generally ovate, or nearly so. The timber of some species, as *W. mollissima and W. coccinea,* is valuable. *W. antidysenterica,* native of Ceylon, yields Conessi Bark, a valuable astringent and febrifuge; *W. tinctoria,* common in many parts of India, yields excellent indigo, and has been recommended for cultivation on this account.

WRIGHTSVILLE, York co., Pa.: on the Susquehanna river, 31 m. s.e. of Harrisburg and 11 m. s.e. of York, was the farthest point east reached by the Confederates during the civil war. In the campaign preceding Gettysburg Gen. Early was ordered to seize the bridge across the Susquehanna at this point, a wooden structure over a mile long, resting on stone piers. Included in the structure was a railroad bridge, a passway for wagons, and also a tow-path for the canal which here crossed the Susquehanna. In 1863, June 28, the bridge was defended by the 27th Penn. militia, a few companies of the 20th and some other organizations and convalescents hastily collected, in all numbering about 1,200 men, under command of Col. J. G. Frick, 27th militia.

Frick held an intrenched line about a half mile west of Wrightsville. Gen. Gordon's brigade, with Capt. W. A. Tanner's battery and White's battalion of cavalry, marching through York, appeared before Frick's position on the evening of June 28 and began skirmishing, under cover of which Gordon endeavored to cut him off from the bridge by a flank movement, but failed, and then opened fire with Tanner's artillery, to which Frick could not reply, being without guns. His rear threatened, Frick retreated across the bridge and fired it, leaving 18 or 20 prisoners in Gordon's hands. Gordon attempted to follow, but was checked by the flames. The bridge was totally destroyed and the flames communicated to the town of Wrightsville, consuming several buildings, but the further progress was arrested by Gordon's men. The destruction of the bridge was a keen disappointment to Early, who had hoped to cross it and attack Harrisburg from the e. side of the river. On the 29th Gordon marched back to York.

WRING, v. *rĭng* [AS. *wringan;* Dut. *wringen,* to wring, to press: Low Ger. *wringen,* to twist: Dan. *vringle;* Ger. *ringen,* to twist, to wrest: intimately connected with *wriggle*]: to turn and strain forcibly, as in forcing water from clothes, etc., after washing; to twist out of place, or connection, as to *wring* the neck of a fowl; to force out, as a fluid, by twisting; to squeeze; to harass; to press with extreme pain; to distort; to persecute with extortion; to bend or strain out of its usual position: N. a forcible twist. WRING'ING, imp.: N. a twisting or writhing; the act of pressing and twisting the hands in anguish. WRUNG, pp. *rŭng,* also in *OE.,* WRINGED, pp. *rĭngd.* WRING'ER, n. *-ėr,* one who wrings; a wringing-machine. TO WRING FROM, to obtain from by violence or other unfair means; to extort. TO WRING OFF, to force off or separate by pressing and twisting. TO WRING OUT, to force or squeeze out by twisting. WRING'-BOLT, in *ship-building,* a bolt used to bend the planks against the timbers till they are permanently fastened. WRING'-STAVE, one of the bars of wood employed in applying the wring-bolts. WRING'ING-WET, a. so wet that water may be wrung out. WRING'ING-MACHINE, an apparatus for squeezing out the moisture from washed clothes.—SYN. of 'wring, v.': to twist; press; writhe; pinch; extort; distress; torture.

WRINKLE, n. *rĭng'kl* [O. Dut. *wrinckelen,* to twist, to curl: Dan. *vringle,* to twist, to go unevenly: comp. Gael. *reang,* a wrinkle of the face: *wrinkle* is a dimin. formed from *wring*]: a small ridge or furrow formed on a smooth surface by shrinking or contraction, chiefly applied to the skin of the face; a crease; a fold or rumple in cloth; *familiarly* [AS. *wrence,* a trick (see WRENCH)]: a hint; a bit of valuable advice: V. to contract or become contracted into small ridges or furrows: to make rough or uneven. WRIN'KLING, imp.

-kling. WRINKLED, pp. *rĭng'kld:* ADJ. having wrinkles. WRIN'KLY, a. *-klĭ,* having a tendency to be wrinkled.

WRIST, n. *rĭst* [AS. *wrist*—from *writhan,* to writhe, to twist: Low Ger. *wrist,* the wrist: Icel. *rist;* Dan. *vrist,* the instep (see WRITHE: WREST)]: the joint on which the hand turns, and by which it is united to the arm. WRIST-BAND, the band or lower part of the sleeve of a garment which covers or comes down to the wrist. WRIST'LET, n. *-lĕt,* a band worn on the wrist: a bracelet; an elastic band on the upper part of a glove which confines the wrist.

WRIT: in general understanding a writ is a mandatory precept issued by the authority of and in the name of the executive branch of the State for the purpose of compelling the defendant to do some particular thing mentioned in the instrument. Writs are generally classified as mandamus, habeas corpus, summons, error, quo warranto, certiorari, or review. Writs are further distinguished as original and judicial. Original issued without any order of the court in the particular case, judicial issued in pursuance of a decree or order of judgment of the court. A writ of mandamus is a command issuing from a court of law of competent jurisdiction, in the name of the state, directed to some inferior court, officer, corporation, or person, requiring them to do some particular thing therein specified, and which appertains to their office or duty. In order to secure a writ of mandamus it is necessary to show (1) that the petitioner has a legal right to have the thing done which it is sought to be done; (2) that it is the duty of the respondent to perform it; (3) that the writ is the only plain, speedy, and adequate remedy. A writ has a purely personal effect. An injunction—either mandatory or prohibitory—is a writ framed according to the circumstances of the case commanding an act which the court regards as essential to justice, or restraining an act which it esteems contrary to equity and good conscience. Quo warranto is an order to show by what authority a given act is done or office held. A writ of error is a commission to a superior court by which they are authorized to examine the record in a case on which judgment has been given in an inferior court. Habeas corpus is an order issued by a magistrate to an officer in charge of the person of the defendant and designed to give summary relief against illegal restraint of personal liberty. Summons is a demand made to a person to appear at a given time before a court or officer. Certiorari or review is an order to a superior court to review the evidence presented before an inferior court.

WRITE, v. *rīt* [Icel. *rita,* to write: Goth. *vrits,* a stroke of a pen: Sw. *rita,* to draw, to trace: Dut. *rijten,* to draw, to tear: Ger. *reissen,* to tear, cut, sketch]: to form characters with a pen or the like on paper or

other material; to express by means of forming letters and words; to compose or produce as an author; to tell or communicate by letter; to perform the act of tracing or marking letters or figures in order to represent sounds or ideas; to send a letter or letters; to combine ideas and express them on paper for preservation or for the information of others; to style or designate. WRI'TING, imp.: ADJ. used or intended for writing: N. the act of forming characters or letters on paper, etc., in order to record ideas for the information of others; anything expressed in letters and words; any written composition; a manuscript; an inscription; a book or pamphlet. WROTE, pt. *rōt.* WRITTEN, pp. *rĭt'n:* ADJ. expressed in letters or words; reduced to writing. WRITER, n. *rī'ter*, an author; a clerk or amanuensis; in *Scot.*, a legal practitioner, holding nearly the same position as an attorney in England; a solicitor. WRI'TERSHIP, n. the office or position of a writer. WRIT, n. *rĭt*, that which is written—applied particularly to the Sacred Scriptures, as *Holy Writ;* a legal instr. to enforce obedience to an order or sentence of a court of justice; a mandatory precept issued by a court or other competent authority in the name of the sovereign or the state commanding the person to whom it is addressed to do or refrain from doing some specified act, as a *writ* of ejectment; a *writ* of error; also a judicial process to summon an offender. WRITING-BOOK, a copy-book used by children learning to write; a blank book for the practice of penmanship. WRITING-CASE, a portable case for holding writing materials. WRITING-DESK, a sloping table for writing on; a portable folding-case with a sloping top when spread open for writing on. WRITING-INK, a fluid, generally black, but of other colors, for writing with. WRITING-MASTER, one who gives instruction in writing. WRITING-PAPER, highly sized and glazed paper for writing on, as distinguished from *printing-paper.* WRITING-SCHOOL, a place where writing is taught. WRITING-TABLE, a table of convenient height for writing at, for a library, etc.

WRIT'ERS' CRAMP, or SCRIVE'NER'S PALSY: peculiar kind of local spasm, in which every attempt to write instantly calls forth uncontrollable movements in the thumb, the index and middle finger, so that the pen starts up and down on the paper, and instead of a legible handwriting, a mere scrawl results. The more the patient persists in his attempt, the more the difficulty of using the pen increases; and to the contractions of the muscles of the thumb, contractions of the forearm, and even of the upper arm, are often superadded. The spasms are instantly arrested when the individual ceases writing, and the hand is capable of all other movements. The disease is chiefly confined to middle age, and scarcely ever occurs in women; and there can be no doubt that an occupation entailing much writing predis-

poses to it, the quality of the paper or of the pen having nothing to do with it. In some cases judicious treatment, combined with entire cessation of writing for a considerable time, has led to satisfactory results. Galvanism and strychnine also have proved useful.

WRITERS TO THE SIGNET: in Scotland, where lawyers generally are called writers, an incorporated legal society dating from an early period of Scottish history. Originally, the name probably applied to clerks in the office of the secretary of state, where was deposited the seal by which the king's letters and writs for the purposes of justice were authenticated. This duty was monopolized by this close society of practitioners, members being appointed not by public officials, but by the organization. Thus the Writers to the Signet came to control admissions to the bar, like the English Inns of Court. They still retain a certain prestige at the bar, but not their former monopoly.

WRITHE, v. *rīth* [Dan. *vride;* Sw. *wrida; OHG. ridan,* to wring or twist]: to turn and twist about; wriggle; to distort; to extort; to wrest; to wriggle and twist about as from pain, etc. WRITHING, imp. *rīth'ĭng:* N. the act of one who or that which writhes. WRITHED, pp. *rīthd.*

WRI'TING: art of fixing thoughts in a palpable and lasting shape, so as to make them known to others. There are two principles employed in this process, either separately or jointly—viz., Ideographism and Phonetism. An ideograph is either a picture of the object the idea of which is to be conveyed, or, at a later stage, some symbol which stands, by common consent, for the object, in which case it is called Symbolism. Phonetism, on the other hand, is either Syllabism—i.e., a combination of consonants and vowels which form a word or component parts of it—or Alphabetism, a system that further breaks up the syllables into their single component parts of vowels and consonants. All systems of writing seem to have originated in ideographism, and to have gradually arrived at phonetism. The pictorial mode of ideography gradually led, as indicated, to the symbolical mode. The former, called also kyriological [Gr. *kyrios,* principal, proper, the opposite of metaphorical or symbolical] writing, contents itself with representing only bodily things, either by fully or partly depicting them, or by merely indicating them by some special characteristic. The latter—the symbolical mode—represents abstract things in accordance with their similarity to corporeal subjects, as in the hieroglyphs of later Egyptian times. Examples of the real delineations of the subjects, or parts of them, which have been replaced by conventional signs, we find at an early period in Egypt, as well as with the Aztecs, with the primitive Assyrians, in ancient China, and in Guiana. Phonetism here no longer aims at a delineation of subjects or symbols, but of the

sounds by which these objects are conveyed to the mind. The first step in phonetic writing is, as we said, the syllabic, which by degrees becomes alphabetical. Difficult though it may be in many instances to fix accurately the original ideographic meaning of many of the letters now in use, there is yet absolutely no doubt as to their having once been mere pictures of certain things to which a meaning was attached, the sound of which was in some shape connected with the present value of the letter. Our knowledge of Phœnician, whence our alphabet is directly derived, and of its cognate dialects, enables us, in many instances, to trace them back to their primitive sources. Thus, our *A* was originally depicted as the head of an *ox*, a likeness to which may still be traced in its Phœnician form, and its name (Aleph=ox) has still survived in Hebrew and Greek (Aleph or Alpha). This process of the gradual change of a picture into a character is most clearly traceable in the various stages of Egyptian hieroglyphics, which, when written more cursively, assumed such different shapes (in hieratic and demotic respectively) that often there remains scarcely a likeness between different forms of the same characters. Among the ideographic methods are some, however, which scarcely seem to deserve the name of writing, in the ordinary sense. Such are the Peruvian quipus or knots, which, by changes in color, size, arrangement, and the rest, indicate a certain special sequence of ideas; further, the 'khernus' or sticks, which, before the introduction of their present alphabet, the Tartars used to circulate among their tribes, to indicate the number of men and horses to be used for some special expedition. Similar to the Peruvian quipus was (according to the celebrated Chinese work, *I-king*) also the primitive Chinese mode of writing; while the Scandinavian and Germanic runes remind us of the Tartar staves. Of a more advanced stage appears the Mexican Pichue-writing, a system by which single syllables or words were expressed by phonograms. The Chinese system appears to combine both the ideographic and the phonetic characters; but there is scarcely a doubt that even the phonetic signs are derived from ideographic ones. The step to the alphabetic system, however, has not been taken by the Chinese.

When and how our present alphabet was invented, has been a problem from the earliest times. The myths of antiquity ascribed it to Thoth (q.v.) or to Kadmus, which only denotes their belief in its being brought from the East (Kedem), or being perhaps primeval. The Talmud ascribes it to a special revelation. It has been a question whether there were several original alphabetical systems, or whether one is to be assumed as having given rise to the various modes of writing now in use. Thus, three principal sources—Semitic, Chinese, Indian—are given by Klaproth. It is, however, now agreed on

all hands that it is the Phœnician character, as we now know it, to which we directly owe our own: see PHŒNICIA. From it many streams have flowed out. The principal of these appears to have been, first, the Semitic, in which the values of the letters have remained almost identical with those of the original Phœnician, except, perhaps, a few sounds added to them in Persian, for expressing certain Indo-Germanic sounds not existing in Phœnician. This class has further been subdivided into Hebræo-Samaritan and Aramaic, the latter embracing the square or modern Hebrew, which is closely allied to the Palmyrene, the Estranghelo or Syriac, the Sabian, the Arabic in its different forms, the Mongol, the Pehlvi, Armenian, etc. The second or central division embraces the writing of Greece, Asia Minor, and Italy, from the Æolo-Doric, Etruscan, Umbrian, Oscan, and other little-known kinds, to the late Pompeian Graffiti. A further group would include the 'Indo-Homerite' characters, and seems to have originated in central Arabia, whence it appears to have spread to Africa and India, where the Magadhi—the oldest variation which the Phœnician assumed here—gave rise to the five families of Devanaghari, Pali, Dravidian, Oceanian, and Tibetan.

Yet, when we speak of the Phœnician as being the mother of all our known alphabets, we must not be understood finally to ascribe to the Phœnicians the original invention of it in the first instance. We only indicate here that the theory to that effect, held by Gesenius and others, will probably, sooner or later, have to give way to the more recent results of De Rougé's investigations, who, with great show of probability, believes the alphabet to have been adapted from certain archaic hieroglyphics of Egypt. It appears as if at some very archaic period the Phœnicians had borrowed the hieratic signs then in use; as, indeed, the *Prisse Papyrus*, the oldest in existence, exhibits striking similarities with the Phœnician characters. Instead, however, of simultaneously taking the Egyptian names for these characters, they invented new ones according to their own fancy and to the supposed similarity of the characters to some particular thing. The Egyptian origin of the Phœnician character, as confirmed by further researches (see Taylor, *The Alphabet*, 1883), was affirmed of old by Tacitus (*Annal.*, xi. 14)—a curious case of old tradition verified.

Several points of this subject have been treated in the course of this work: see HIEROGLYPHICS: CUNEIFORM: ALPHABET, ETC. We only add in this place that the manner of writing is very different with many nations. The Mexican picture-writing begins at the bottom; the Chinese and Japanese, as well as the Mongols, write in columns beginning from the top and going from right to left. The Egyptian hieroglyphics have no fixed direction; but the hieratic and demotic, though the single let-

ters are formed from right to left, always run from left to right; as is also the case in Ethiopic, Cuneiform, and Indo-Germanic languages generally. The Semitic languages have retained the Phœnician mode of writing from right to left—all but the numerals—a mode still retained in archaic Hellenic and Etruscan. By degrees, however, the writer not wishing to return to the beginning of the line, and continuing right underneath the last word penned, a double mode was introduced, called the boustrophedon—as the ox plows. Finally this too was abandoned, and the direction from left to right was followed. For the many various styles of modification that our characters have undergone in the course of ages, the punctuation of the words, and the rest, see ALPHABET. The materials and the instruments (see PAPYRUS: PEN: ETC.) differed much at various times. Consult Steinthal, *Die Entwickelung der Schrift* (1852); Wuttke, *Geschichte der Schrift* (1872).

WRITING MACHINES: appliances to facilitate writing, or to produce copies of MSS. by processes known as type-writing, manifolding, transfer-surface, and stencilling. For an important class of such machines, see TYPE-WRITER. Manifolding processes are those in which at a single writing several copies are produced. A special paper, thin and tough, is usually employed to receive the writing. The production of the characters is effected by paper coated with an easily transferable pigment, which is termer carbon-paper. A typical carbon-paper would be coated with a mixture of lard-oil and bees-wax as a menstruum, mixed with iron-logwood, lake, and Prussian blue, as pigments. In use the thin paper alternates with sheets of carbon-paper, the latter coated on only one side. The messeage is written on the upper sheet with a hard point of agate, or with a lead-pencil, and the pressure transfers the coloring matter to the interleaved sheets below it, exactly in the line of writing. The identical process is applied to the type-writer, on which 8 or 10 copies can be taken at one striking. Transfer-surface processes are generally conducted by writing out the copy with special ink on paper. The copy is then pressed smoothly upon the prepared surface, which takes off the reverse impression. Clean sheets may be pressed upon the impression, which will yield a large number of copies, each sheet of paper receiving an imprint of the characters. The hektograph, in which the transfer-surface is of gelatine and glycerine, and in which aniline ink is used, is typical. Besides this, zinc and prepared paper have been used as surfaces and lithographer's or printer's inks have been employed instead of aniline colors. Stencil processes generally depend on the production of a paper-stencil plate of the writing. Special thin, hard, sized or waxed paper is used for the stencil. In one machine a stylus carrying at its point a minute wheel is used. The wheel is armed

with points like those of a cog-wheel. The stencil paper is placed on a sheet of zinc or other proper surface, and the inscription is traced with the wheel: this perforates the letters with a series of minute dots. On placing the stencil sheet thus prepared over a sheet of writing-paper, and running an inked roller over the stencil, the writing is reproduced. The same stencil may be used for hundreds of copies. Other stencil processes prepare the stencil by placing the paper over a rough surface, such as a piece of file-cut steel, and with a solid pointed stylus the message is written. The result is the perforation of the letters with minute dots corresponding to the passage of the hard steel stylus over the roughened surface. Electricity has been used to make stencils. A handle carries a small motor which projects and retracts with great rapidity a needle-point at the end of the handle. On moving this over the paper, it is perforated as in the other methods, and a stencil sheet is the result. For all processes some nicety of manipulation is required, and the apparatus may be somewhat complicated. The hektograph is perhaps the most simple, but gives only a limited number of copies. For the stencil processes a frame for holding the stencil, hinged so as to swing down upon the bed-plate for printing, and up again to allow the paper to be removed, with inking-roller, ink-slab, and accessories, is furnished, besides the stencil-producing mechanism.

WRITTEN, v. *rĭt'n.* See WRITE.

WRIZZLED, a. *rĭz'ld* [an adaptation of *grizzle*]: in *OE.*, wrinkled.

WROEITES: a sect named from John Wroe, who died in Australia 1863, Feb. 6, and who claimed to have received Divine revelations. They are few in numbers, and sometimes called Christian Israelites. They teach the immediate second coming of Christ.

WRONG, n. *rŏng* [AS. *wrang,* pt. of *wringan,* to wring (see WRING): Icel. *rangr,* crooked, unjust: Dut. *wrang,* acid, harsh; Dan. *vrang,* wrong]: that which is wrung, twisted, or turned aside from the right or straight way to the desired end; error; injury; injustice: ADJ. turned aside from a straight line; crooked; not right; unfit; unsuitable; not according to truth: AD. in a wrong manner; amiss; ill: V. to injure; to treat with injustice; to impute evil unjustly to. WRONG'ING, imp. WRONGED, pp. *rŏngd.* WRONG'ER, n. *-ėr,* one who wrongs or inflicts injury. WRONG'FUL, a. *-fûl,* injurious; unjust. WRONG'FULLY, ad. *-lĭ.* WRONG'FULNESS, n. *-nĕs,* the state of being wrongful. WRONG'LY, ad. *-lĭ,* in a wrong manner; unjustly. WRONG'NESS, n. *-nĕs,* the state of being wrong. WRONGOUS, a. *rŏng'gŭs,* in *Scots law,* illegal; not right; constituting a wrong. WRONG'DOER, one who does wrong; in *law,* one who commits some wrong for which an action may be brought to recover damages.

WRONG'DOING, n. evil or wicked actions. WRONG'HEADED, a. obstinately wrong in opinion; perverse. WRONG'-HEADEDNESS, n. the state or quality of being obstinately wrong in opinious.—SYN. of 'wrong, a.': injurious; unjust; faulty; erroneous; incorrect; detrimental; criminal; untrue.

WRONG, GEORGE MCKINNON: Canadian educator: b. Ontario 1860, June 25. He was educated at University and Wycliffe colleges in Toronto, took orders in the Church of England and in 1894 succeeded Sir Daniel Wilson as prof. of history in the Univ. of Toronto. He is co-editor with H. H. Langton of the annual *Review of Historical Publications Relating to Canada.*

WROTE, v. *rōt:* pt. and obsolete past participle of WRITE (q.v.).

WROTH, a. *rawth* [see WRATH]: very angry; much exasperated.

WROUGHT, v. *rawt:* pt. or pp. of WORK. WROUGHT-IRON, decarbonized cast-iron; cast-iron rendered tough and malleable by puddling, etc. (see IRON).

WROX'ETER. See URICONIUM.

WRUNG, v. *rŭng:* pt. and pp. of the verb WRING (q.v.).

WRY, a. *rī* [akin to *writhe:* OE. *wrien,* to twist: AS. *wrigian,* to drive]: twisted; turned to one side; crooked; perverted: V. in *OE.,* to bend; to twist abnormally; to writhe; to deviate from the proper direction; to distort. WRY'ING, imp. WRIED, pp. *rīd.* WRY'NESS, n. *-nĕs,* state of being distorted. WRY-MOUTHED, a *-mowthd,* having the mouth awry. WRY'NECK, a neck distorted or drawn to one side; name of a bird of the genus *Yunx,* allied to the woodpeckers (see below). WRY'NECKED, a. distorted; turned to one side.

WRY'BILL: an extraordinary plover (*Anarhynchus frontalis*) of New Zealand, which is unique in having a bill bent sideways near the tip,—always toward the right. By this peculiarly adapted instrument it seems to be able to reach and obtain many small crustaceans, etc., which are able to creep under stones out of reach of all the other shore-birds of the region, which have only the ordinary straight kind of beak. The questions and inferences which arise in the mind of the evolutionist in view of this case will be found treated in Newton's *Dictionary of Birds,* with references to other authorities. See PLOVER.

WRY'NECK: a European bird (*Iynx* or *Yunx torquilla*), related to the woodpeckers, which has a habit of twisting its head in a curious manner. This bird visits Great Britain in summer, arriving in April, usually with or just before the cuckoo, and hence is named the 'cuckoo's mate.' The food consists of insects, and chiefly of ants and their pupæ. It is also said to eat elderber-

ries. The tongue is long and extensile, like that of the woodpeckers. The nest is formed in the holes of trees; and the eggs vary from six to ten.

WU-CHANG, or WOO-CHANG, China: a city of the province of Hu-peh, on the Yang-tse-kiang, opposite the city of Hankow. The latter is in effect but a suburb of Wu-chang, another portion on the n. bank of the river being Hanyang. It is the great emporium for the tea exported by way of Shanghai. Pop. variously estimated from 500,000 to 1,000,000.

WUDWAN, *wŭd-wân'*: town of India, in the peninsula of Kattywar, province of Guzerat; 105 m. w.-by-n. from Baroda; on a small river, which falls into the great salt-marsh, the Runn of Cutch. The surrounding district is under high cultivation, and is famed for the excellent cotton which it produces.—Pop. 32,220.

WU-HU, China: a treaty-port, opened in 1877, in the province of Ngan-hwei, on the right bank of the Yang-tse-kiang river, about 200 m. w. of Shanghai. Some manufactures and a considerable trade are carried on. The number of vessels entered in 1901 was 2,002, with a total tonnage of 2,098,840. The total value of the imports in that year was $5,776,810, comprising cottons, opium, sugar, kerosene, bags, woolens, metals, etc.; and the exports were valued at $4,080,145, including rice, rape-seed, raw silk, wheat, feathers, beans, ground-nuts, etc. Wu-hu suffered severely in the Tai-ping rebellion. Pop. 92,000.

WULFENITE, n. *wûl'fĕn-īt* [after the Austrian metallurgist *Wulfen*]: a mineral of an orange-yellow color occurring in short prismatic or pyramidal crystals; the molybdate of lead. It crystallizes in hemimorphic tetragonal crystals. They are usually in square tabular plates, sometimes very thin and transparent, but occasionally in elongated pyramidal forms and nearly opaque. The mineral also occurs in crystalline masses. It is very brittle, has a hardness of about 3 and is very heavy, its specific gravity ranging from 6.7 to 7.0. Its lustre is resinous to adamantine, and colors are various shades of yellow, orange, red, grayish or greenish. It is associated with other lead ores at many localities, as in Austria-Hungary, and New South Wales, but the United States localities are far more important. Magnificent specimens occur in the Red Cloud and Mammoth mines in Arizona, in the Organ Mountains, New Mexico, at Eureka, Nevada, and Tecoma, Utah. It has been used to a limited extent as an ore of molybdenum.

WULSTAN, or WULFSTAN, sometimes WOLSTAN: name of interest in connection with Anglo-Saxon history and literature. Three individuals called Wulstan are specially noticeable.—I. A monk of Winchester in the 9th c., author of a poem, in Latin hexameters, on the miracles of

St. Swithin, reputed the best Latin poem of that age produced in England.—II. An archbishop of York, 1003, author of two pastoral letters and several sermons in Anglo-Saxon, the most remarkable of which is printed in Hickes's *Thesaurus,* III.—III. The Bishop of Worcester, and a saint of the English calendar: about 1007-95; b. Icentum, in Warwickshire; educated at Evesham and Peterborough; became a priest, afterward a monk, and prior of the monastery of Worcester, and 1062 bishop of that see. He lived through the troubles of the Norman Conquest, and had the favor of the Conqueror and of William Rufus. He is said by some to have been the author of the portion of Anglo-Saxon Chronicle which extends from 1034 to the death of the Conqueror.

WUNDT, *vûnt,* WILHELM MAX: German physiologist: b. Baden, 1832. Studied medicine at Tübingen, Heidelberg, and Berlin; was private tutor at Heidelberg 1857, prof. 1864, and, after a year at Leipzig, prof. of physiology at Zürich from 1874. His works have wide reputation, especially in connection with psycho-physics, or the measurement of the relation of physical stimuli to the resulting mental facts. His *Physiologische Psychologie* (1874) furnished the basis of much of Prof. Ladd's *Physiological Psychology.* The translated titles of Prof. Wundt's other principal works are: *Studies on the Movement of the Muscles* (1858); *Theory of the Perception of the Senses* (1862); *Lessons on the Life of Men and Animals* (1863); *Researches on the Mechanism of the Nerves and the Nerve Centres* (1871-76); *Spiritualism—a Seience-like Question* (*wissenschaftliche Frage*) (1879).

WUPPER, Germany: a river in the governments of Cologne and Düsseldorf after a course of about 60 m. Rhine. It rises on the Westphalian frontier, and flows first n.w. and then s.w., joining the Rhine between Cologne and Düsseldorf after a course of about 60 m. It is not navigable for vessels of any size, but it provides considerable power for manufacturing purposes. Its valley is the most populous in Germany, and contains the important industrial towns of Barmen, Elberfeld, and Solingen. In its upper course it is called the Wipper.

WUPPERTHAL, *wûp'ĕr-tâl:* deep narrow valley of Rhenish Prussia, named from the river Wupper, or Wipper, a small affluent of the Rhine, which flows through it. The Wupper rises between the towns of Wipperfürth and Hückeswagen, 26 m. n.e. of Cologne. Its course is first n., then n.w., past Barmen and Elberfeld —the chief town on its banks; then s.w. to its junction with the Rhine between Wiesdorf and Rheindorf, 7 m. below Cologne, after a course of 50 m. The valley of the Wupper is the most actively industrious and most densely peopled in all Germany. Coal is found in abundance.

WURALI, n. *wô'rä-lĭ,* or WOU'RALI, or WOO'RARI, n. *wô'rä-rĭ,* or URARI, *ô'rä-rĭ:* variants of Woorali.

WÜRTEMBERG.

WÜRTEMBERG (or WÜRTTEMBERG) *wür'tĕm-bĕrch*, KINGDOM OF: European kingdom in the s.w. corner of the German empire; 8° 15′—10° 30′ e. long., and 47° 35′—49° 35′ n. lat.; bounded w., s.w., and n.w. by the grand duchy of Baden; e., s.e., and n.e. by Bavaria; and s., for a few leagues, by the Lake of Constance and Vorarlberg. Hohenzollern makes a deep indentation into the land from the south, and the entire boundary is very irregular. Detached pieces of territory belonging to W. also lie in the adjacent countries. Its greatest length, from the village of Simmringen, in the n., to the Lake of Constance, in the s., is 139 m.; greatest breadth, from the Katzenkopf, in the Black Forest, e. to the castle of Duttenstein in Neresheim, 105 m. Pop. (1890) 2,036,556. The following table gives the area and the population according to the census in 1900.

Circles.	Miles.	(1900).
Neckar	1,285	745,669
Black Forest	1,843	509,258
Jagst	1,984	400,126
Danube	2,419	514,427
Total	7,531	2,169,480

W. is fourth in population of the states of the German empire, after Saxony and before Baden; but is third in point of size, having greater area than Saxony. The total pop. 1900 was 2,169,480.

The cap. is Stuttgart (q.v.). In 1900 the pop. of Ulm was 42,982; Esslingen 27,325; Heilbronn 42,982; the pop. of Stuttgart (1895) 158,231; (1900) 176,699.

Physical Aspect.—The surface of W. is composed of terraces of hill and dale, the lowest point being 420 ft. above sea-level. In the Black Forest circle the mountains attain the hightest elevation, the Hornisgrinde rising 3,825 ft. One point of the Swabian Alps is nearly 3,000 ft. high. The valleys and plains average 500 ft. elevation. Rich pastures, cultivated fields, orchards, gardens, hills covered with vines, and mountains with forests, give the most diversified scenery. In the s.e. are extensive peat-lands.

Rivers, Lakes, etc.—The most important rivers are: the Neckar (q.v.), with its affluents; the Danube (q.v.), which receives the Iller; and the Tauber, tributary of the Main. The Neckar and its streams drain 4,200 sq. m.; the Danube 2,037; the rivers which fall into the Lake of Constance 714; the Tauber 315 and other water-courses 168 sq. m. The only lake in the interior is the Federsee, near Buchau, in the Danube circle. There is much traffic both by steam and sailing vessels on the Neckar, and from Friedrichshaven, on the Lake of Constance.

Geology, Mineralogy, etc.—The prevailing rocks are granite, gneiss, limestone, and various sandstones. Tour-

maline, cobalt, bismuth, silver, malachite, chalcedony, gypsum, copper, rock-crystal, and iron occur. Salt, alabaster, slate, millstone and building stone are also found in W. A great variety of fossils have been found. The peat-lands are extensive, and yield annually 450,000 florins. Fire-clay of excellent quality, earths for dyeing, and native sulphate of lime, are worked. Building materials, from the granite of the Black Forest to the tufa of the Alb valley, abound. Clay-band ironstone, yielding 30 to 36 per cent. of iron, is worked in 11 different districts, and salt in five.

The climate is mild and healthful, but in the highlands the winters are long and cold. When w. winds prevail, the cold of winter and summer heat are less than in some countries in the same latitude. The greatest quantity of rain falls in summer. Of the total area about 25 per cent. is occupied by plains or level ground, 46 per cent. is hilly, and 29 per cent. mountain-land. The soil is mostly very fertile and well tilled. The vineyards are chiefly in the Nekar circle and that of the Jagst. The forests, grain, and pasture lands are nearly equally distributed through all the circles. Wheat, oats, barley, rye, potatoes, beans, maize, turnips, mangel-wurzel, lucerne, etc., are principal agricultural products. There are extensive orchards in all parts: cherries, damsons, walnuts, peaches, apricots, and the more common fruits, are largely grown. Timber is largely grown and exported, especially from the Black Forest regions. Large and small cattle are plentifully reared. Large cattle, which in W. are generally fed in the stall, constitute the principal export of W. to Switzerland and neighboring lands. Forestry and the various branches of agricultural science are diligently promoted by numerous technical institutes.

Manufactures, Industries, etc.—The manufactures are chiefly linen, woolen, cotton, and silk fabrics. Wool and cotton spinning, bleaching, dyeing, printing, iron-founding, cutlery, gold and silver articles, glass, porcelain, earthenware, tile, cabinet-work, sawing wood, carriage-building, grinding corn, book-printing and cognate trades, paper, wooden clocks, toys, musical instruments, machinery, surgical and optical instruments, chocolate, sugar, bricks, cement, cotton thread, nickel wares and hosiery are principal industries. There are many oil mills, beer breweries, and brandy distilleries. Water is to a large extent the motive-power in the manufactories and mills. In W., more than 215,500,000 bottles of beer, or 125 for each person, are consumed yearly, besides wine, brandy, and liqueurs. The total value of land, houses, railways, movables, etc., is reckoned at about $1,350,000, and the income of the people at about $137,000,000—$70,000,000 being from land produce, $65,000,000 from the industries, and $2,000,000 from interest on foreign funds. The exports are chiefly grain, cattle, wood, salt, oil, leather, woolen, cotton, and linen goods, beer, etc.

Religion, Language, Education, etc.—The population of old Würtemberg is almost entirely Lutheran. In 1900 1,497,299 were Prot. evangelicals, 650,311 Roman Catholics; 9,426 other churches, and 447 other religions. Of the whole pop. (1900) 69 per cent. were Protestants.

Several dialects of German are spoken, of which the Swabian and Franconian are the most general. W. has been the native country of many distinguished men, of whom a few are: in poetry—Schiller, Uhland, Wieland, Kerner: in theology and philosophy—Brentz, Œcolampadius, Bengel, Schelling, Hegel, Baur, Strauss, etc.; in science and art—Kepler, Stiefel, Tobias Mayer, the botanists Joseph and Karl Friedrich Gärtner, the chemist Schönbein, the painter Eberhard Wächter, Hetch, and the famed sculptor Dannecker.

Every child between 6 and 14 years must attend school. In a district having 30 or more families is a public school, and a teacher for every 90 children. There are theol. seminaries, with a course of four years; gymnasia, grammar, trades, and high schools in all the principal towns. The univ. at Tübingen has nearly 100 ordinary and extraordinary professors and tutors. The number of students averages about 1,000, of whom 200 to 300 are foreigners. At Hohenheim is an agricultural and botanical institution, in which farming, management of forests, and gardening are scientifically taught. Stuttgart has a polytechnic school, one of the best institutions of the kind in Germany. It is stated that there is not in W. a person above ten years of age who cannot both read and write.

Revenue, Expenditure, etc.—In 1904–5 the estimated revenue was $22,895,380, expenditure $23,006,385, debt $130,416,000.

Government, etc.—The crown is hereditary in the male line, and failing that, in the female. Freedom of the press and religion are maintained. The privy council consists of a pres., the six ministers of state, and members named by the king. The legislative body is composed of two chambers—the first formed of princes of the royal family, nobles, and members appointed by the king, the class last named not exceeding a third part of the whole; the second chamber is composed of 13 representatives of the knighthood, 6 Prot. gen. superintendents, the bp. and two others of the Roman Cath. clergy, the chancellor of the univ., 7 representatives from the cities Stuttgart, Tübingen, Ludwigsburg, Ellwangen, Ulm, Heilbronn, and Reutlingen, with a representative from each of the 64 bailiwicks. Members of the second chamber are not eligible as such before their 30th year. The king has the power of proroguing or dissolving the chambers: but in the latter case a new election must take place within six months. As a member of the reconstituted German empire W. has 4 votes in the federal council, and 17 representatives in the diet of the empire. W. furnishes the 13th Corps to the German army. It consists of 23,851 men on a peace footing.

WÜRTEMBERG.

History.—The earliest inhabitants of W. were probably Celts; but when the Romans came first to know the country, it was held by the Suevi, who were succeeded by the Alemanni and the Franks. In 1090 Conrad, Count of Würtemberg, possessed a castle near Cannstatt, with limited territories, which were largely increased by Ulric. I. 1246–65. Other extensions were gained by Eberhard I. 1279–1325; by Ulric II., who, though a man of peace, added Tübingen; Eberhard II., who secured Teck, Gutenberg, Kirchheim, Herrenberg, and other places. By the marriage of Eberhard IV. with the Countess of Montbéliard, that county became connected with Würtemberg. At his death, the possessions were divided between his two sons, each of whom enlarged his portion; and a few years after their death, Eberhard V. secured a reunion, and the land advanced rapidly in power and importance. In 1495 Emperor Maximilian raised Eberhard to the rank of duke, with the title Eberhard I. In 1519, Duke Ulrich having offended the Swabian League by some arbitrary acts of oppression on the imperial free city of Reutlingen, he was forcibly ejected from W., and did not reconquer his estates till 1534. While Eberhard III. was duke (1628–74), W. suffered much in consequence of the Thirty Years' War. Ludwig Eugene (1793–95) having taken part in the war against the French republic, a French army attacked and compelled him to resign Montbéliard and pay 8,000,000 francs.

With Duke Frederick II., who succeeded his father 1797, the most important period in the history of W. begins. In 1800, compelled by the French to flee from his dukedom, he got back, by the peace of Lunéville, all his territories except Montbéliard, and instead had others granted, with the rank of elector. Having aided Napoleon in the war against Austria, at the peace of Presburg (1805) W. was further enlarged and made a kingdom. On 1806, Jan. 1, Frederick I. assumed the royal title. He joined the Confederation of the Rhine in the same year and received additional territory, and as an ally of Napoleon in the French-Austrian War of 1809 was rewarded for his services with new possessions, including Ulm. Würtemburg was required to furnish a quota of 16,000 men for Napoleon's Russian compaign. On 1813, Nov. 2, after the battle of Leipzig, Frederick abandoned the cause of Napoleon, joined the other German princes in their rising against the French power, and concluded a treaty with Austria, in which his lands were guaranteed. His reign was arbitrary; and internal troubles were thickening around him, when he died 1816, and was succeeded by his son, William I. (1781–1864), who was born at Lubin, in Silesia, 1781, Sept. 27. He was cordially welcomed to the throne, and the expectations of his subjects were realized. His first acts

were to reduce the expenditure, and introduce other reforms, prominent among which was the liberal constitution of 1819. In 1848-50 there was strong agitation with the view of obtaining some permanent modifications in this constitution, but without success. For nearly 50 years he reigned over a people steadily increasing in prosperity. His son, Charles Frederick Alexander, known as Charles I., b. 1823, succeeded him. On his death, 1891, Oct. 6, he was succeeded by his cousin, Wilhelm II., b. 1848, Feb. 25. See GERMANY.

WURTZ, *vürts,* CHARLES ADOLPHE: French chemist: b. Strasbourg, 1817, Nov. 26; d. Paris, 1884, May 12. He was educated at the Prot. gymnasium in that city, graduating B.L. 1834; studied medicine, and graduated M.D. 1843; pursued chemistry under Liebig, and 1844 under Dumas at Paris. From 1847 till his death he occupied successively a number of chairs in the principal institutions of Paris, for many years holding that of chemistry in the School of Medicine, also in the Sorbonne. He received many honors, prizes, and medals, and was made permanent senator 1881. Among his most remarkable discoveries were the hydride of copper, the compound ammonias, and evidence that free hydrogen is a compound with itself. His investigations and papers were very numerous, and after 1858 were published mostly in *Répertoire de chimie pure,* which he edits. Among his works are: *Traité élémentaire de chimie médicale* (3 vols. 1864-5); *Leçons élémentaires de chimie moderne* (1866-68); *Dictionnaire de chimie pure et appliquée* (1868); *Les hautes études pratiques les universités allemandes* (1870). Portions of these have been translated under the titles *Chemical Philosophy according to Modern Theories,* and *Theory from the Age of Lavoisier.* His latest books were *Théorie Atomique* (1879), and *Traité de chimie biologique* (1885).

WURTZ, *vûrts,* HENRY, PH.D.: chemist: b. Easton, Penn., 1828, June 5. He graduated at Princeton 1848; studied chemistry at the Lawrence Scientific School at Harvard; was assistant in chemistry at Yale; state chemist of N. J., and on its geological survey; prof. of chemistry in Queen's Coll., Canada, 1857, and in the National Medical Coll., Washington, D. C., and patent-office examiner 1858-61. Removing to New York, he edited the *Amer. Gaslight Journal;* and continued his researches, which are many and important, including original methods of producing alum and potassium salts from greensand, fuel-gas from cheap coal, magnesia from seawater, liquid and other products from coal; and other economic processes. Since 1888 he has been employed as chemist by Thomas A. Edison. His scientific papers and reports are numerous.

WURTZITE: in mineralogy, a dimorphous form of zinc blende. Crystallization, hexagonal; hardness 3.5 to

4; specific gravity, 3.98; lustre, resinous; color, brownish black; streak, brown; composition, a sulphide of zinc; ZnS; occurrence, in a silver mine near Oruro, Bolivia, in Portugal, Peru, and near Butte City, Montana.

WÜRZBURG, *vürts'bûrch:* city, capital of the former principality of Würzburg, now of the Bavarian circle of Lower Franconia; in a beautiful valley on both sides of the Main, over which is a stone bridge 600 ft. long, of eight arches. Among the public buildings, the most distinguished are the episcopal palace or residence, rebuilt 1720-44, one of the most magnificent royal residences in the world; and the spacious and excellently equipped Julius Hospital, established 1576. Of the many churches, the most notable are the richly decorated cathedral, rebuilt in the 11th and following centuries; the Marienkapelle, one of the most beautiful monuments of old German art, with 14 statues of the 15th c. by Tilmann Riemenschneider; and the Neumünster Church, containing the bones of St. Kilian. The streets adjoining the Palace Square are wide and straight, but most of the others are narrow and crooked. In front of the Julius Hospital is a bronze statue of the founder, Bp. Julius, by Wiedemann, founded in bronze by Miller: a monument of Walther von der Vogelweide (q.v.) stands in a niche outside the Neumünster Kirche.

The University of Würzburg was founded 1582 by Bp. Julius, who founded the hospital. The endowments for both institutions were taken from the possessions of the convents destroyed during the Peasant War (q.v.). To promote the study of medicine, the hospital was put in connection with the univ., the professors of medicine being made physicians and surgeons to the hospital: this connection has kept the medical faculty in high reputation, and promoted the prosperity of the univ. The medical staff includes several names of European reputation. All the professors of the theological faculty are thoroughgoing advocates of the dogma of papal infallibility. There is also a faculty of political economy. The library has 200,000 vols. In the Musical Institute, any one can receive instruction gratis in singing or in playing any instrument; and twice a week great musical pieces are performed. Besides the univ., there is a gymnasium, a Latin school, a district agricultural and trade school, a seminary for Rom. Cath. priests and a seminary for training teachers, an orthopedic institution, a veterinary school, a school for midwifery, a swimming school, a society for improvement of the arts and manufactures, and a female society for encouragement of skill in arts and handicrafts among women. Besides the Julius Hospital, there are asylums for the deaf and dumb and for the blind, and other charitable institutions. The manufactures are woolen stuffs and cloth, mirror-glass, leather, tobacco, railway carriages,

and sparkling wines. The fortress of Marienberg, on the site where Drusus founded a castle, is on a hill 400 ft. high, on the left bank of the Main, outside the town. The campaign of the Prussian army of the Main ended with a battle before Würzburg, 1866, July 27. The fortifictions have been demolished.—Pop. (1900) 75,499.

WÜRZ'BURG, or WIRZ'BERG: former sovereign bishopric or ecclesiastical principality of the German empire, in n.w. Bavaria; now chiefly included in the circle of Lower Franconia; founded 741 (according to other accounts, 742 or 746); area 1,827 sq. m. It received endowments from the Frankish kings, which were increased by the German emperors. The first bishop was Burkhardt, consecrated by Boniface. The patron saint was Kilian, said to have preached the gospel here as early as 688. By good management and economy, the bishops were able to acquire numerous possessions of the neighboring Frankish proprietors; and out of these was gradually formed the extensive sovereign bishopric of Würzburg, ruled over by the prince-bishop as Duke of Franconia. The ducal title and authority were conceded first about 1120. In spiritual matters the bishops were under the abp. of Mainz. At the peace of Lunéville (1801), the bishopric of Würzburg, like the other spiritual principalities of Germany, was secularized; and 1803 the greater part of it was conferred on the Elector of Bavaria as a secular principality. The last prince-bishop received a pension, and died at Bamberg 1808. At the peace of Presburg (1805), Bavaria gave up Würzburg to the Grand Duke Ferdinand of Tuscany, and the principality was raised to the dignity of an electorate. In 1806 Elector Ferdinand joined the Confederation of the Rhine, and from that time took the title Grand Duke of Würzburg. By a decree of the Vienna Congress, the grand duke received his hereditary state of Tuscany, and Würzburg reverted to Bavaria. Pop. about 250,000.

WÛ-SÛNG, or WOO-SÛNG, *wô-sông':* town of China, at the mouth of the river Wû-sûng (the river by which Shanghai is approached); about 13 m. below that city. Just above Wû-sûng is a bar which is gradually silting up, and forms a serious obstacle to the movements of the large steamers engaged in the foreign trade with Shanghai. Efforts have been made, but without avail, to induce the Chinese govt. to remove this bar—the Chinese regarding it as a 'heaven-sent' barrier for defense of the city.

WU TING-FANG, Chinese diplomatist: b. near Canton. After education at Canton and Hong Kong, he went to England in 1874 for the study of law, having found Chinese merchants greatly at disadvantage through ignorance of the English language and law, and was the first Chinese to be made a barrister (1877). He

established himself in successful practice at Hong Kong, where his services proved of great value. For several years he was a secretary on the official staff of Li-Hung-Chang, but first came prominently into notice as secretary of the peace commission to Jajan after the war with that country. His skill in these diplomatic negotiations obtained for him the post of envoy extraordinary and minister plenipotentiary to the United States, Spain, Mexico, and Peru (May -1897). During the Boxer troubles in the summer of 1900 he made skilful representations to the state department, for which when no news was obtainable from Peking, he transmitted a message to Minister Conger and secured an answer. He used English fluently; was stated to have been the first Chinese minister to address American audiences, which he did frequently; wrote numerous articles for American magazines; and received the degree of LL.D. from the Univ. of Pennsylvania. In 1902 he was recalled, in 1903 became vice-president of the Chinese 'board of commerce,' and in 1907 returned to the United States.

WUSHKUM: (from the name of their chief village), meaning a species of louse or flea, a tribe of the Chinookan stock of North American Indians. They call themselves *Tlaqluit*, and are the Echeloot of Lewis and Clark and the Wisham, Wishram, etc., of other writers. They occupy the n. bank of Columbia river, Wash., from Tenino to the neighborhood of White Salmon river. They subsist largely on salmon, and are not reservation Indians, although they took part in the Yakima treaty of 1855. Their number is not known, but it is small.

WYANDOT: English adaptation of the French Ouendat, or Hoüandate, later written Guyandotte, the Huron name for themselves, signifying 'They are islanders.' A tribe composed of the remnants of several politically independent Iroquoian tribes and confederacies whose political integrity was destroyed by the Iroquois during the middle of the 17th c. Today the Wyandots so-called live in the Indian Territory, where they number about 290; at Anderdon, Ontario, where the last report says two remain; and at Lorette, Quebec, Canada, where some Hurons who are in fact Wyandots, dwell, numbering about 458; the whole aggregating about 750. All these tribes when first encountered by Europeans were organized into well-governed communities. The social and political organizations were based strictly on blood kinship, real or fictitious. Fictitious kinship was obtained through the rites of adoption. These peoples dwelt in lodges constructed of bark, which were long in figure, sometimes having as many as ten or twelve fires with a family on two sides of each fire. The many lodges were usually collocated into villages, many of which were quite strongly palisaded. For their sustenance they depended chiefly on agriculture, raising corn and beans of several varieties, squashes and sunflowers for oil. They

tanned and dressed the hides of the animals which they killed. The prepared skins they neatly and skilfully utilized in the preparation of their raiment and their bedding. Reeds and barks of various kinds were useful in making mattresses and other needed articles. The title to their lands was vested solely in the mothers of the people. The choice of a candidate for chief for either of the two grades of this office was solely a prerogative of the mothers of the clan to which the chieftain belonged. The chief held his office during good behavior.

WYANDOTTE, Mich.: city in Wayne co.; on the Detroit river, and on the Grand Trunk, the Michigan Central, the Detroit Southern, and the Lake Shore & Michigan Southern railroads; 12 m. s. of Detroit. It has alkali works in which there are 1,200 employees; rug and fur coat factory, 300 employees; ship-building works, 500; baking soda and starch factory, 75; salt works, 300; and a number of other manufacturing establishments. The two banks have a combined capital of $100,000; and the annual business is about $900,000. There are 10 churches, a high school established in 1873, three public schools, four parish schools, and a public school library. The government is vested in a mayor and a council of six members elected annually in April. Wyandotte was settled before 1850 by Major John Biddle. It was platted in 1854, and in 1867 was incorporated. The government is administered under a charter of 1896. Pop. (1900) 5,183. (1910) 8,287.

WYANDOTTE CAVE: in Crawford co., Ind., a natural formation, second in size to Mammoth Cave, but having a greater number and variety of stalactites and stalagmites than any other cave in the United States. It has been explored for a distance of 23 m. The chambers and galleries are numerous, some about 350 ft. long and 180 ft. high. Some of the remarkable features are Monument Mountain, about 175 ft. high, and 75 ft. above its crests is the grand dome. The Pillared Place contains several clusters of stalactites, and the Pillar of Constitution, a large stalagmite 30 ft. high and 75 ft. in circumference.

WYANT, *wī'ant*, Alexander Helwig: American artist: b. Port Washington, Tuscarawas co., Ohio, 1836, Jan. 11; d. New York, 1892, Nov. 29. After trying the saddlery business, he turned to art, became a painter of landscapes at Cincinnati, exhibited in the National Academy of Design in 1865, was elected associate of the academy in 1868, and academician in 1869. In 1865 he went to Europe, becoming a pupil of Hans Gude at Carlsruhe. He attained high rank in landscape art, painting almost exclusively American scenes, and being particularly successful in views from the Adirondack wilderness. He was a founder of the American Water-Color Society. Among his works are: *Scene on the Upper Sus-*

quehanna (1869); *Pool on the Ausable* (1871); *In the Adirondacks; A North Woods' Brook; An Old Clearing; Pool in the North Woods; New Jersey Meadows* (1872); *Sunset on the Prairie* (1876); *Reminiscence of the Connecticut* (1878); *Evening* (1885); *Sunset, near Killarney* (1886); *October Day* (1892). His chief characteristics are subtle tones, the evanescent moods of nature that he was quick and able to catch, and a delicate quality of workmanship.

WYATT, James: English architect: b. Burton Constable, Staffordshire, 1746, Aug. 3; d. Marlborough, Wirtshire, 1813, Sep. 5. He was taken to Rome in 1760 by Sir William Bagot, and during the next six years studied architecture in that city and in Venice. Returning to London, he brought himself into notice by his designs for the Pantheon, in Oxford street, a building for many years famous as the rendezvous of the fashionable world. He received innumerable commissions for private residences in all parts of the kingdom; but his designs, for the most part in a sort of Græco-Italian style, have little at the present day to recommend them. About 1782 he turned his attention to Gothic architecture, being one of the first to attempt its revival; and for many years was employed as a restorer of cathedrals and parish churches, in the course of these labors making sad havoc at Salisbury, Hereford, Durham, and elsewhere. It must be said, however, that his imperfect conceptions of Gothic art were shared by his contemporaries and approved by the taste of his time, in large measure. His most famous work in this style was Fonthill abbey, erected for Beckford in 1795. He held the position of surveyor-general subsequent to 1796, and in 1802-3 was president of the Royal Academy.

WYATT, Sir Matthew Digby: English architect and art writer: b. Rowde, near Devizes, Wiltshire, 1820; d. London 1877, May 21. He made a diligent study of the architecture of Italy, France, and Germany, returning to England in 1846 to publish his *Geometrical Mosaics of the Middle Ages* (1848). In 1856 he was appointed architect to the East India Company, and made many important designs for public works in Great Britain and India; in 1866 was awarded the royal gold medal of the Royal Institute of British Architects; and in 1869 was knighted and made Slade professor of fine arts at Cambridge. His chief books are: *Metal Work and Its Artistic Design* (1852); *Industrial Arts of the 19th Century* (1853); *Art Treasures of the United Kingdom* (1857); *Fine Art* (1870); *Architect's Handbook in Spain* (1872).

WYATT, Richard James: English sculptor: b. London 1795, May 3; d. Rome 1850, May 29. He entered the Royal Academy as a student, afterward worked for a time in the studio of Bosio in Paris, and ultimately completed his professional education under Canova at

Rome. In the last city he took up his permanent residence from 1821, making only one brief visit to England in 1841. He is one of the best English sculptors in the delineation of poetical and classical subjects. Among his works are *Penelope; The Huntress,* and *Flora,* besides several memorials.

WYATT, Sir THOMAS: English poet: b. Kent about 1503; d. Sherborne, Dorsetshire, 1542, Oct. 11. He was graduated from Cambridge in 1518, may have studied at Oxford, and subsequently went on his travels to the Continent. After his return to England he appeared at court, where the reputation he has already acquired as a wit and a poet introduced him to the notice of Henry VIII., who retained him about his person and knighted him in 1537. He was employed on several diplomatic missions to different powers, and was a friend of Thomas Cromwell, in whose fall he ran some risk of being involved. In 1542 he was returned to Parliament as knight of the shire for Kent. A close student of foreign literature, Wyatt introduced the sonnet into England from Italy. In this he is commonly associated with Henry Howard, Earl of Surrey, but is more correctly to be regarded as the pioneer. None of Wyatt's verse, sacred or secular, appeared in his lifetime. Some of the secular poems were printed (96 are assigned to Wyatt) in the *Songes and Sonnettes* (1557) of Richard Tottel, commonly known as *Tottel's Miscellany.* There are among the extant works 31 sonnets, and satires in heroic couplets, imitated from Persius and Horace. Wyatt's poems evince more elegance of thought than imagination, while his mode of expression is far more artificial and labored than that of Surrey.

WYCH-ELM, n. *wĭch'ĕlm* [from same root as WITCH-HAZEL]: a variety of the elm, *Ulmus montāna.*

WYCHERLY, *wĭch'ĕr-lĭ,* WILLIAM: comic English dramatist of the period of the Restoration: about 1640-1715, Dec.; b. at Clive, near Shrewsbury. His father, a cavalier squire of £600 a year, sent his son to France at the age of 15; and during his residence on the banks of the Charente, the youth was a favorite at the court of the gov. of Angoulême, whose accomplished wife, the Madame Rambouillet of Voiture, converted him to the creed of the Church of Rome. On his return to England 1660, Wycherly studied a short time at Oxford, where he was reconciled to the Anglican Church; and he was then entered of the Middle Temple. Neither at Oxford nor at the Middle Temple did Wycherly distinguish himself as a student. He was above all things a fine gentleman, and a man of society. He naturally gravitated to the literature of the stage. His first comedy, *Love in a Wood,* was acted with great applause, and published 1672, and it was followed by three other successful comedies—*The Gentleman Dancing-master* (1673); *The Country Wife* (1675); and *The Plain Dealer* (his best

work) (1677). About 1680, the dramatist was married to a young and rich widow, the Countess of Drogheda, whom he had met at Tunbridge. The lady was distractedly jealous of him, kept him from frequenting the court, which lost him the favor of the king, and watched him closely wherever he went. Indeed, his marriage, kept secret at first, when it had come to the king's knowledge caused the king to change his plan of committing to Wycherly the education of his son, the Prince of Wales. The countess did not live long, and she left him the whole of her fortune; but his succession to the estate was disputed, and an expensive lawsuit ensued, the costs of which, added to personal debts, fairly broke down the unlucky dramatist. He was committed to the Fleet, and languished there neglected for seven years. He was partly relieved by the bounty of James II.—probably because he returned to the communion of the Church of Rome—and he succeeded to the patrimonial estate in Shropshire by the death of his father. This did not, however, much relieve him, as the estate was heavily mortgaged and strictly entailed. He was on bad terms with the heir-at-law, his nephew; and, it is said, on purpose to injure this relative, Wycherly, at the age of 75, married a young girl, on whom he settled a jointure; and 11 days after this transaction—perhaps the most scandalous act of his life, as Macaulay describes it—the old dramatist died. It is, however, entirely possible to assign other motives for this marriage than that which roused Macaulay's animadversion. Wycherly was interred in St. Paul's Church, Covent Garden. Besides his comedies, he published a volume of wretched *Miscellany Poems* 1704; and another volume, partly of 'moral reflections,' was published after his death. The comedies of Wycherly, on which his fame rests, reflect the literary taste, the manners, and vices of the times in which he lived: thus they are, in truth, grossly immoral and profligate. They have, however, some literary excellence. The language is clear and forcible, the dialogues are often witty and lively, some of the characters vigorously drawn; and the observations and maxims scattered throughout the different scenes are shrewd and sensible, and expressed in a terse, sententious style. Wycherly is regarded as the creator of brilliant dramatic repartee. He was the founder of that school of artificial comedy which Congreve, Farquhar, and Sheridan carried to its highest perfection, imparting to it an airy grace and brilliancy far above the reach of its master.

WYCLIFFE, (or WYCLIF, or WICLIF, or WICLIFFE, or WICKLIFFE), *wĭk'lĭf*, JOHN DE: greatest of all the 'Reformers before the Reformation': about 1320-1384, Dec. 31; b. conjecturally in the parish of Wycliffe-on-Tees, near the town of Richmond in Yorkshire, England. [His name is spelled in 28 different days.] He studied at Ox-

ford; but of his early university career nothing is known.

Wycliffe emerges into public notice 1361, when his name appears as master of Balliol Hall—as Balliol College was then called. In May of that year he was instituted to the rectory of Fylingham, in Lincolnshire, and shortly afterward resigned his mastership and went to reside at his rectory. About 1363 he took his degree, and began to read lectures on divinity at Oxford, in which his anti-Roman views were first expounded. In 1368 he exchanged the rectory of Fylingham for the living of Ludgershall, in Bucks; and in 1374 was presented to the parish of Lutterworth, of which he remained priest till his death.

In the great struggle maintained by Edward III. and his parliament against the claims of the papacy regarding the exaction of certain tribute-money granted by King John in acknowledgment of the fealty of the kingdom to the Roman see, Wycliffe, who had been advanced to be one of the king's chaplains, was called to reply to a defense of the papal claim, which had been anonymously sent abroad. This he did publicly at Oxford in an ingenious and powerful manner, and thus early showed his antipathy to the political pretensions of Rome. A clear evidence of his growing reputation is furnished by his appointment, 1374, as second in a commission sent to Bruges to confer with the papal legate as to certain abuses on the part of the papacy complained of by the English parliament. It was probably on his return from this mission that Wycliffe was promoted to a prebend in the diocese of Worcester, and at the same time presented to the rectory of Lutterworth, in Leicestershire. Here he labored with great zeal, preaching on Sundays and on the several festivals of the church, and showing himself 'a most exemplary and unwearied pastor.' Here also he began openly to speak his mind as to the papacy. The insight into papal doings which he had received at Bruges seems to have confirmed suspicions previously forming in his mind, and he is said, soon after his return to England, to have styled the pope 'Antichrist,' 'the proud worldly Priest of Rome, the most cursed of Clippers and Purse-kervers' (cut-purses). Then began in earnest his troubles with the hierarchy. Early in 1378 he was summoned to a meeting of Convocation, to be examined for his opinions. He obeyed the summons, but he appeared attended by his friend John of Gaunt and others. A great tumult ensued, the London citizens bursting into the chapel, and frightening the synod of clergy, who were ordered to sist proceedings. The papal authority was then invoked against Wycliffe, and Gregory VI. issued several bulls—three to the archbishop of Canterbury and other bishops, one to the king, and one to the University of Oxford—commanding an inquest into Wycliffe's erroneous doctrines. Wycliffe was accordingly again summoned

before the prelates at Lambeth; but on this occasion he escaped with an injunction to refrain from preaching the obnoxious doctrines.

This served only to make Wycliffe a more thorough Reformer. He now entered on his great work of translating the Scriptures, or rather, for the most part, of revising existing translations and circulating them among the common people. He had a great retinue of 'poor preachers,' as his itinerants were termed, whom he sent in all directions to preach among the common people. He also challenged the dogma of transsubstantiation; though he always believed in some kind of real presence. Many of the people, the burghers and the middle class, heard him gladly, and affairs seemed tending to an open rupture with the papacy. But the times were not ripe for this. Many who otherwise sympathized with the Reformer were afraid of his views about transsubstantiation. He was summoned to answer especially on this head, first before a synod at the Greyfriars, London, finally before Convocation 1382. He appeared, and defended himself with great subtlety and power. His defense was unavailing. Twenty-four 'erroneous' statements were picked out of his works, which were in consequence condemned and ordered to be burned. He was banished from Oxford, but was allowed to retire to his parish of Lutterworth. His health was already shattered by hard work and many anxieties, and on the last Sunday of the year 1384 he was stricken by paralysis while conducting public worship, and three days afterward expired.—Wycliffe appears to have been a man of simple faith and of earnest and manly courage. He made a strong impression on his age—an impression which seems to have been not entirely effaced even to the time of the Reformation. The Lollards, as his disciples were called, were not only among the poor, but also in the church, the castle, and even on the throne. Political mischances, however, overtook the party in the following century, and only a few traces of it survived here and there when the movement on the 16th century began. In Bohemia John Huss was Wycliffe's disciple; and from Huss's works, largely extracts from Wycliffe's writings, Luther drew much of his reformatory spirit and equipment. See HUSS, JOHN.

The pre-eminence of Wycliffe is due to the influence of the Bible on him, as well as to the fact that he first gave the volume entire to the world in English translation. From it he had already drawn his evangelical doctrines, his profound experience of Christian truth, his fearless protest against the errors of the dominant church, his persistent intrepidity in opposing these; and none the less his exaltation of character, his scriptural and spiritual preaching, and his zeal to bring the people to the knowledge of the saving truth, prompting him to send forth humble preachers, many of them laymen, into

the highways and byways—thus anticipating Wesley by three centuries and a half. It was as the greatest instrument in this practical work that his translation of the sacred volume was undertaken; and it was his burning zeal to enlighten and save the people that shaped this translation into the pure English, simple yet noble, which has made our common version, largely founded on his, the enduring standard of our Anglo-Saxon tongue. Trained in all the learning of his university, and accustomed to controversies with the learned that involved all the subtleties of the schools, Wycliffe could instantly resort to the vernacular, and put himself in full sympathy with the common folk, in his preaching, pamphleteering, and translating. It has been well said that his translation 'marks an epoch in the development of the English language, almost as much as Luther's translation does in the history of the German tongue. The Luther Bible opens the period of the new High German; Wycliffe's Bible stands at the head of the Middle English.' John R. Green, in his *Short History of the English People*, says, 'If Chaucer is the father of our later English poetry, Wycliffe is the father of our later English prose.' But the literary marvel is the least of all, in Wycliffe's far-reaching work. In the words of Dr. R. S. Storrs's oration at the Wycliffe semi-millennial celebration by the American Bible Society, 1880: 'How vast the impression produced by the version which thus burst into use, not on language only, but on life, in the whole sphere of moral, social, spiritual, even political experience, who shall declare!'

T. Arnold published 3 volumes of Wycliffe's select works 1871; and F. D. Matthew his hitherto unprinted *English Works* 1881. The *Trialogus* was edited by Lechler 1869: see Lechler's *Johann von Wycliffe* (1873), translated (1878) by Prof. Lorimer; and *Wyclif's Place in History*, by Montagu Burrows (1882).

WYCOMBE, *wĭk'om* or *wī'kom*, or HIGH WYCOMBE, or CHIPPING WYCOMBE: municipal and parliamentary borough in Bucks, England; surrounded by beech-clad hills; 29 m. w.n.w. of London; on the Wye, small affluent of the Thames. The Church of All Saints is a large and handsome building, erected 1273; it is in Norman and Early English architecture, and consists of a nave and two aisles, and with the chancel is 180 ft. long. The tower, built 1522, is 96 ft. high. There are corn and paper mills on the Wye; and beech-wood and other chairs are made here on a large scale—the chairs annually averaging in number more than 1½ millions. The village of West Wycombe is near. Pop. (1901) 15,532.

WYE (written also Y), n. *wī:* the letter Y or something resembling it; a crotch, used in many ways as a temporary shore or brace. Also, a stem or pipe with branches, as a stand-pipe or delivery-pipe with two issues

from its summit: one of the supports of a telescope, theodolite, or levelling instrument.

WYE, *wī:* river of England, of picturesque beauty and considerable importance, an affluent of the Severn; rising in two copious springs on the s.e. side of Plinlimmon, less than 2 m. from the head-water of the Severn (q.v.). It flows s.e. through Montgomeryshire and Radnorshire, forming the s.w. and s. boundary of the latter, e.s.e to the middle of Herefordshire, and then s., dividing in its lower course the county of Monmouth from that of Gloucester, and entering the estuary of the Severn below Chepstow. Length 130 m., for 70 m. of which, to Hereford, it is navigable for barges, though large vessels cannot ascend above Chepstow Bridge. At Chepstow (q.v.) the tide rises higher than at almost any other place in Great Britain. The part of the river which separates Monmouth from Gloucester is that chiefly visited for its singular beauty.

WYETH, *wī'ĕth,* JOHN ALLAN, LL.D.: American surgeon: b. Marshall co., Ala., 1845, May 26. During the civil war he served as a private in the Confederate army, was taken prisoner and held for 15 months. In 1869 he was graduated in medicine at the University of Louisville, and in 1873 from the Bellevue Medical College, where he was assistant demonstrator in anatomy 1873-4. He was surgeon to the Mount Sinai Hospital 1880-97, and in 1882 founded the New York Polyclinic Medical School, the first American post-graduate medical school. He has published: *Essays on Surgical Anatomy and Surgery; Text Book on Surgery* (1888); *Life of General Nathan Bedford Forrest* (1899); etc.

WYKEHAM, *wĭk'am,* WILLIAM DE: English architect, prelate, and chancellor: 1324-1404, Sept. 27; b. Wickham, in Hampshire. He was educated at Winchester. In 1347 the bishop of Winchester introduced him to the king as a young man whom he might find useful in architecture, etc. For some years, though he had received the tonsure, his employment was mostly secular, as surveyor and clerk of works, and warden of castles. In 1362 he was ordained deacon and priest; 1363 archdeacon of Northampton and prebendary of Wells. In 1364 he was appointed keeper of the privy seal. He was in high favor with the king, and one of the most eminent men of the kingdom. In 1366, by the king's recommendation, he was elected bishop of Winchester, and was consecrated 1367, Oct. 10. Meanwhile he had been appointed lord high chancellor of England. He resigned 1371, on a petition being presented to the king against the government remaining too long in the hands of men connected with the church. He now devoted himself to various objects of lasting usefulness. His preparatory college or school at Winchester was opened for teaching 1373; but the building was not begun till 1387: it was

finished 1393: see WINCHESTER COLLEGE. In the college which he instituted also at Oxford, teaching had begun 1373; but the building of 'St. Mary's College of Winchester in Oxford,' usually called New College (q.v.), was not begun till 1380: it was finished 1393. He began the rebuilding of Winchester Cathedral 1395, and just lived to see it finished. Meanwhile he had become the object of resentment to the Duke of Lancaster and party, at whose instance he was indicted for pecuniary defalcation and other crimes alleged to have been committed by him as keeper of the privy seal and lord chancellor. He was heard 1376 before a commission of peers, bishops, and privy councillors, declared guilty, and a severe sentence was passed on him. It was, however, ultimately commuted into a fine, which was remitted on the accession of Richard II. 1377. He was one of the council of 14 appointed to the king 1386, and 1389 he was again made lord chancellor. He continued in office till 1391, when he resigned; and thenceforth appears to have taken little active part in public affairs. He was present in the parliament 1399, Sept. 30, when Richard II. was deposed. He was also present in the first parliament of Henry IV. He died at South Waltham.—See *Life* by Dr. (afterward Bishop) Lowth (Lond. 1754).—Wykeham of Wykeham was one of the most munificent benefactors of the English Church. He loved learning, order, civilization, and purity of manners, and as bishop of Winchester signalized himself by his rigorous reformation of ecclesiastical abuses; but he had not the slightest tendency toward *Protestantism* in doctrine, affording in this respect a striking contrast to his great contemporary Wycliffe (q.v.). Wykeham of Wykeham may be taken as the type of a class of English Churchmen both before and after the Reformation—men destitute of zeal on questions of doctrine, but zealous for the dignity, culture, and practical efficiency of the church.

WYLIE, *wī'lĭ*, ROBERT: artist: 1839-1877, Feb. 4; b. in the Isle of Man. His family emigrating to this country when he was a child, he was educated here, studying art in the Pennsylvania Academy. At 24 years of age he went to Paris, where he gained a medal at the Salon; and, continuing to reside there, he was little known here except through a few meritorious paintings, such as the *Death of a Vendean Chief*, painted in 1876, and now in the Metropolitan Museum, New York.

WYLLYS, GEORGE: Puritan colonist, and governor of Connecticut: 1570-1645, Mar. 9; b. Fenny Compton, Warwickshire, England. An ardent Puritan, with a university education and a large estate, he sent his steward, William Gibbons, and 20 workmen, to Hartford, Conn., 1636, to buy him an estate and build a mansion. He came with his family 1638; was one of the framers of the constitution 1639, and chosen one of the first magistrates; was deputy governor 1641, governor 1649. Wyllys

was held in high esteem for excellence of character. In manners he was simple. He was a great advocate of liberty in state and church.—His son, SAMUEL WYLLYS (b. 1632, Warwick, England; d. 1709), graduated at Harvard 1653; was elected a magistrate 1654, and held office under the charter more than 30 years. It was in a phenomenally ancient oak on his estate that the charter was hidden. See CHARTER OAK.

WYLLYS, SAMUEL: revolutionary soldier: 1739, Jan. 15—1823, June 9; b. Hartford, Conn.; son of George Wyllys 1710-96, who was grandson of the colonist George Wyllys, and who graduated at Yale 1729, was town-clerk of Hartford 1730-96, and secretary of the colony 1734-96. Wyllys graduated at Yale 1758; was appointed lieutenant-colonel of Spencer's regiment 1775; commanded a regiment at the siege of Boston; became a colonel in the Connecticut line 1776; and served to the close of the war. On his return to Hartford, he was prominent in civil office, and at his father's death became secretary of the colony 1796-1809. When he resigned on account of failing health, there lacked but two years of a century during which his grandfather, Hezekiah Wyllys, colony secretary 1712-30, his father, and himself had continuously served as secretary of Connecticut colony and state.

WYMAN, *wī'man*, JEFFRIES, M.D.: comparative anatomist: 1814, Aug. 11—1874, Sept. 4; b. Chelmsford, Mass. He graduated at Harvard 1833, and from its medical school 1837; was demonstrator of anatomy in that school, and curator of the Lowell Institute, Boston, where he gave a course of lectures on comparative anatomy 1840; spent three years in Paris and London in his studies; and was professor of anatomy and physiology in Hampden-Sidney College, Va., 1843-47. He succeeded Dr. John C. Warren as Hersey professor of anatomy at Harvard 1847, which position he retained until his death in Bethlehem, N. H. In 1849 he gave a course of Lowell lectures on comparative physiology, which, as published in pamphlet form from full reports in a Boston paper, had extensive circulation. He travelled in South America 1856, and again, crossing the continent, 1858-9, enriching science and at the same time his pioneer museum of comparative anatomy, which was subsequently added to the collections of the Boston Society of Natural History. His principal publications were of new researches in their day: such as *The Osteology of Troglodytes Gorilla* (1847); *The Anatomy of the Nervous System of Rana Pipiens* (Smithsonian Contributions 1853); *Observations on the Development of the Skate* (1864); *On the Skeleton of a Hottentot* (1865); observations in 1867 opposed to spontaneous generation; etc. In the biographical memoirs of the National Academy, 175 titles of his books and papers are given. His courses of lectures were popular with scientific students at Harvard. In his later

years he gave much attention to archeology, discovering and investigating prehistoric shell-heaps, both north and south; and he left a work, published 1875, *Fresh-water Shell-mounds of St. John's River, Florida.*

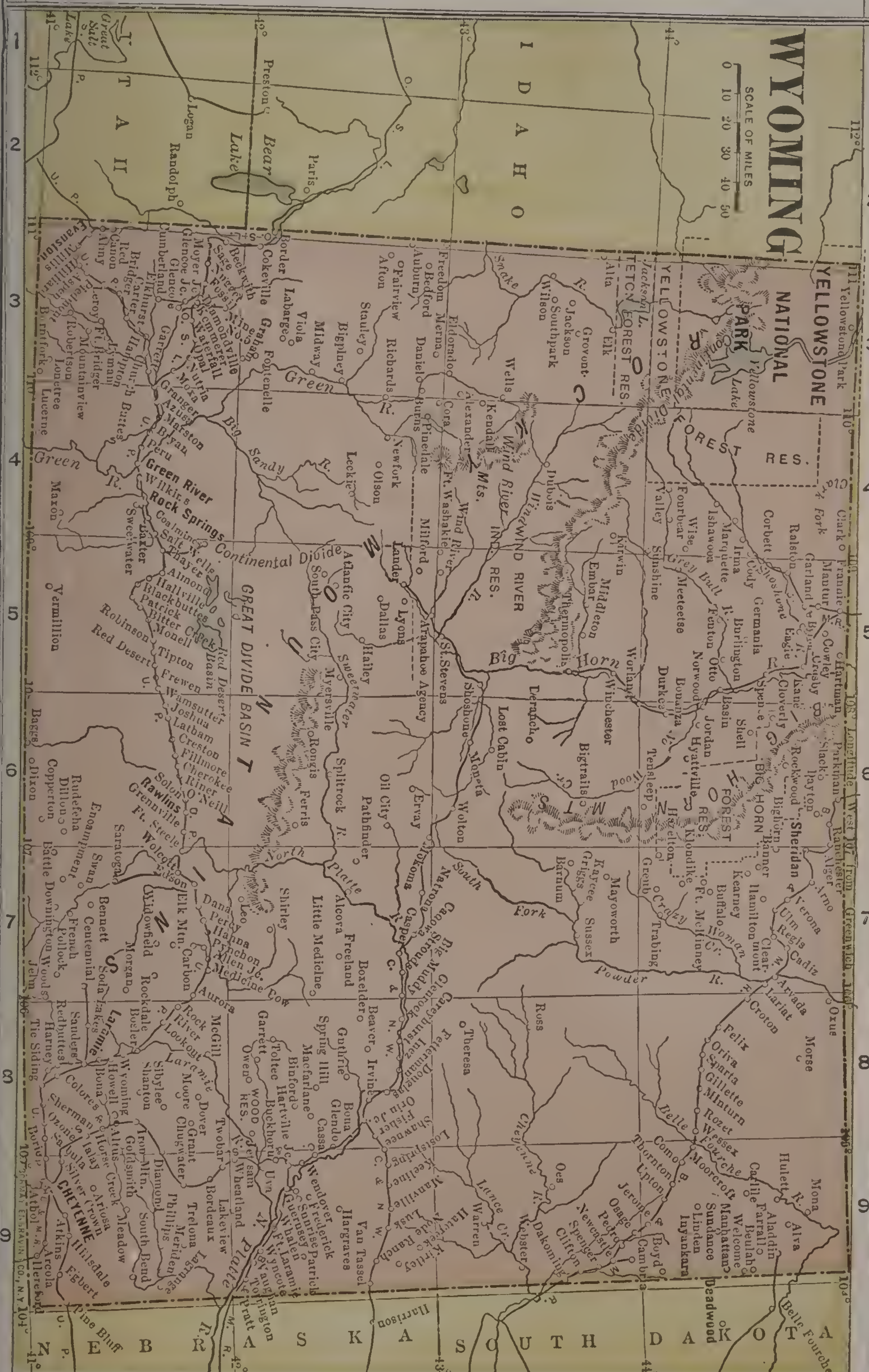
WY'MAN, Robert Harris: naval officer: 1822, July 12—1882, Dec. 2; b. Portsmouth, N. H. He entered midshipman 1837, Mar. 11; at Naval School, Philadelphia, 1842-3; passed midshipman 1843, June 29; served as acting master of a frigate 1843-46; was in the Gulf squadron in the Mexican war, and took part in the siege and capture of Vera Cruz; served at Washington at the Naval Observatory 1848-50, and again 1853-4. In the civil war, after other service, he commanded the Potomac flotilla; was promoted commander 1862, July 16; was on blockade service 1863-4; was commissioned captain 1866, July 25; served as chief hydrographer 1869-77; was made commodore 1872, July 19; rear-admiral 1878, Apr. 26; commander-in-chief of the n. Atlantic fleet 1879-82; and chairman of the light-house board 1882, June 5. He died suddenly in Washington.

WYMAN, Walter: American surgeon: b. St. Louis, Mo., 1848, Aug. 17. He was graduated at Amherst in 1870, and at the St. Louis Medical College in 1873; served in city hospitals 1873-5, and since 1876 has been in the Marine Hospital service, being made assistant surgeon in 1876, chief medical purveyor of the quarantine division in 1888, and supervising surgeon-general in 1891. He was an earnest advocate for the sanitation of ports not only in the United States, but in the West Indies and South America, holding that if this were enforced yellow fever would be entirely eradicated from the western hemisphere. On his recommendation the government set apart a large tract of land at Fort Stanton, N. M., for a hospital whither all consumptive patients in the United States marine hospitals could be transferred.

WYND, n. *wīnd* [AS. *windan,* to bend, to twist]: in *Scot.,* a lane or alley in a town.

WYNDHAM, Sir William: English statesman: b. Orchard-Wyndham, Somerset, 1687; d. Wells, Somerset, 1740, July 17. He was educated at Oxford, and entering the house of commons for his native county, identified himself with the Tories, became secretary at war in 1711, and in August, 1713, was transferred to the office of chancellor of the exchequer. He was suspected of treasonable relations with the pretender, and lost his office on the death of Queen Anne. A reward of $5,000 was offered for his apprehension. After lurking for some time in disguise he surrendered himself and was committed to the Tower. Released without a trial, he remained till his death a leader of the parliamentary opposition to the ministry of Sir Robert Walpole. He was a very graceful, clear, forcible, and spirited orator.

Area in Square Miles, 97,890.	Population, 29,865.
Number of Counties, 14.	Capital of Stato, Cheyenne.



WYN'KOOP, HENRY: 1737, Mar. 2—1812, Oct. 24; b. Northampton co., Penn.; descendant of Gerardus Wynkoop, settler in Moreland, Penn., 1717. Wynkoop acted on a patriot county committee 1774; was a deputy to the provincial conference 1774, July 15, and to that at Carpenter's Hall, Philadelphia, 1775, June 18; took military service as major of a battalion; served on the general committee of safety 1776, July—1777, July; succeeded Edward Biddle as member of congress 1779, Mar. 3; was re-elected 1780, Nov. 24, and again 1781, Nov. 22; was a justice of the court of common pleas 1780-89; and was a member of the first United States congress 1789-91. He served 1791-1812 as associate judge of Bucks co., Penn.

WYNN, *wĭn,* RICHARD: revolutionary soldier: 1750-1813; b. in e. Virginia. He became a continental soldier early in the revolution; was lieutenant of rangers in South Carolina 1775, and took part in the battle of Sullivan's Island; had command at Fort McIntosh, Ga.; was made colonel and put in charge of the militia in Fairfield district, South Carolina; fought in the Hanging Rock engagement, and was wounded; but remained in active service to the close of the war, when he became a brigadier-general, and later major-general of militia. He was elected to the 3d United States congress from South Carolina, and served 1809-13.

WYNTOUN, *wĭn'ton,* ANDREW OF: old rhyming Scottish chronicler, in the beginning of the 15th century. Except that he was prior of the monastery of St. Serf on Loch Leven, and wrote *The Orygynale Cronykil of Scotland,* well known and valued by students of that kind of curious literature, scarcely anything is known regarding him. His work is not without historical importance; while philologically it has very distinct value, as a specimen of the old Scotch, then as nearly as might be identical with the contemporary dialect of England. The *Orygynale Cronykil* consists of nine books or cantos, of which only the last four pertain to Scottish history; the first five giving a fragmentary outline of the history and geography of the ancient world. From his quotations, Wyntoun seems to have been a well-read scholar for his time. In 1795 a splendid edition was published by Macpherson (revised and enlarged by D. Laing, 3 vols. 1872-79).

WYOMING, *wī-ō'mĭng:* state; one of the United States of America; 44th in order of admission into the Union, 31st under the federal constitution; organized as a territory from parts of Dakota, Idaho, and Utah 1868; admitted as a state 1890, July 10; name derived from the Indian *Maughwauwame,* meaning 'plains.'

Location and Area.—Wyoming is in lat. 41°—45° n., long. 104°—111° w.; bounded n. by Montana, e. by South Dakota and Nebraska, s. by Colorado and Utah, w. by Utah, Idaho and Montana; extreme length e. to

w. 365 m.; extreme breadth n. to s. 275 m.; land surface 97,575 sq.m., water surface 315 sq.m., gross area 97,890 sq.m. (62,649,600 acres); capital Cheyenne.

Topography.—The general surface is mountainous, with foot-hills, bold bluffs, innumerable 'buttes' or flat-top hills rising abruptly from plateaus, and broad rolling plains; mean elevation above sea-level about 6,000 ft.; range of extremes 3,000—14,000 ft. The state is traversed n.w. to s.e. by the main range of the Rocky Mountains, and the subordinate ranges and spurs are known as the Wind River Mountains in the n.w.; Snow Mountains e. of the Wind river; Big Horn Mountains still further e. and in the n.; Rattlesnake Mountains s. of the Big Horn and near the centre of the state; Black Hills in the e., partly in Wyoming and partly in South Dakota; Medicine Bow Mountains in the s.; Sweetwater Range s. of Sweet river; and Bishop, Queen, and Horned mountains near the s. boundary and e. of Green river. Though several of the great rivers of the continent, including the Missouri, the Colorado, and the Columbia, have their head-waters in Wyoming, and though there are about 600 streams of water, large and small, in the state, none of the water-courses are navigable, and their present value is chiefly for irrigating purposes (see *Agriculture*, below). The Yellowstone and its tributaries, the Big Horn, the Powder, the Little Missouri, and the Cheyenne, flow from the n. and empty into the Missouri; the Green river and its tributaries traverse the s.w. and empty into the Colorado; the Snake river is the chief tributary of the Columbia in the w.; and the n. fork of the Platte, with its many affluents, flows through the centre and s.e. parts. About 7,000,000 acres of surface are heavily timbered, and nearly as much more is sparsely timbered. The soil is generally a rich sandy loam, and where irrigated produces abundantly the cereals, vegetables, and fruits common to the n.w. states. The stock-raising industry comprised 1890 nearly one-half the total wealth of the state, and 1885 more than three-fourths; but the rapid extension of railroads is giving increased prominence to other interests.

Climate.—The climate is cool in summer, and from mild to intense in winter. There are but few snow-storms, but a large proportion of them are accompanied by fierce wind. The average winters are neither long nor severe, and the high mountains shield the valleys from the blizzards common elsewhere in the n.w. region. The rainfall averages 14 in. on the plains, and about 40 in. on the mountains; mean temperature 46° on the plains, 36° on the mountains; average of whole year through the state 44°.

Geology.—The geological surveys of the state, as far as completed by the state geologist, demonstrate that the outcropping and underlying material forming its physical structure is greatly varied in character, nearly all the precious, superior, and baser metals being found

in large quantities. The mineral wealth of the state aside from coal can hardly be said to be developed. Coal is found in every county; extensive basins of petroleum are known to exist in the n.e., central, and s.w. parts; gold and silver bearing ores have been found and profitably worked in numerous localities; and other known properties of value are iron ore, gypsum, soda, salt, sulphur, copper, lead, tin, mica, marble, granite, sandstone, mineral paint, kaolin, fire-clay, graphite, cinnabar, magnesium, asbestos, nickel, and cobalt, the last two discovered 1892, May.

Zoology.—The mountain forests and foot-hills abound in wild animals, such as black and grizzly bears, wolf, wolverine, buffalo, elk, black-tailed deer, big-horn sheep, prong-horn antelope, and porcupine, mink, skunk, hare, rabbit, prairie-wolf, prairie-dog, etc. Among 124 species of birds are 12 varieties of birds of prey, and numerous game and song birds. Trout and other fish swarm in the streams.

Agriculture.—Crops cannot be raised without irrigation, save in small quantities along the streams, but irrigation is now increasing in the state and helping to advance its agricultural importance. For a long time practically no crops were grown to any extent, but now good returns are secured from corn, wheat, oats, barley, rye, potatoes and hay. The number of farms is constantly on the increase, and this will undoubtedly continue to be true as irrigation makes more and more land arable. A large portion of the state is extremely well adapted to grazing, and n. W. is almost exclusively a cattle and sheep raising section, the value of the stock raised being greater than that of all the crops. The wool product is extremely valuable.

Minerals and Mining.—W. has gold, silver, and most of the valuable minerals found in the Rocky Mountain region. Granite, sandstone, limestone, and copper are very valuable, while the oil fields of the state are proving most productive. Coal is one of the most important mineral products, being worth about $10,000,000 a year, while coke is also valuable.

Manufactures.—There are over 500 manufacturing establishments in W., with aggregate products valued at more than $10,000,000 a year. The principal manufactures are lumber and timber products; railroad cars and supplies, harness, saddlery, boots and shoes, clothing; flour; lime, brooms, cement; tobacco; and malt liquors.

Transportation.—Although the tracks of some very important lines pass through the state, W. has poor railroad facilities, there being a total trackage of only about 1,500, which is not nearly adequate for a state of such size. The service is far behind that enjoyed by most of the other states, while practically none of the rivers within the state are navigable for commercial purposes.

Finance and Banking.—The total assessed valuation of property is $186,560,916; the tax rate is $2.67 per $1,000; and the bonded debt $120,000. There are about 25 national banks, about 15 state banks, and about an equal number of private banks.

Education.—W. spends about $500,000 a year in the maintenance of its public schools, in which there are about 20,000 pupils enrolled, with about 1,000 teachers. It is very difficult to provide for the education of all the children in a country so sparsely settled, but the state attempts to establish schools at convenient points wherever at least five pupils can be found to attend. The educational institutions include, besides the regular public schools, a normal school, a business college, a few private academies, and the University of W. Indian government schools have also been established, as well as private schools for Indian boys and girls. Teachers' institutes are provided by law.

Charities and Corrections.—These include an asylum at Cheyenne for the deaf, dumb, and blind, but, owing to the lack of occupants of the sort for which it was intended, this has been very largely used as a home for soldiers and sailors. The state insane asylum is located at Evanston, and there is a state hospital at Rock Springs. The penitentiary, first located at Laramie, is now at Rawlins. There are also denominational charities, maintained for the most part by the Roman Catholic Church.

Government.—Under the state constitution both sexes are granted equal political rights and privileges, including the right to vote. All the state officers are elected for the term of four years and the treasurer is not eligible for re-election. The governor, secretary of state, auditor, treasurer, and superintendent of public instruction constitute the executive department. The salary of the governor is $2,500; of each of the other officers $2,000. The legislature holds biennial sessions, beginning on the second Tuesday of January of each odd year, and the term is 40 days. The legislature is composed of 23 senators and 50 members of the lower house. The salary of each member is $5 a day and mileage. The capitol is at Cheyenne. The state has one representative and the usual two senators in the United States congress.

Each one of the counties has its own set of county officials.

History.—The stories of Spanish exploration have been much discussed, but the evidence is entirely inconclusive. The first white explorer of whom there is satisfactory record was the Chevalier de la Verendrye, a French-Canadian fur-trader who had settled on Lake Nepigon in 1728, and who, with a view toward developing commerce with the natives, passed 11 years of travel in the western wilderness. He passed through Wyoming in 1743-4, on his return journey. According to the most

1. Science Hall, University of Wyoming.
2. Hall of Languages.

authentic accounts, the first American to enter Wyoming was John Colter, who in 1807 discovered the Yellowstone region. The Wyoming section soon thereafter became the scene of the activities of American fur trappers and traders—among them Capt. B. L. E. Bonneville, 7th United States infantry, whose adventures have been narrated in a well-known work by Washington Irving. The territory comprised within the present state belonged (with the exception of the southwestern corner—a portion of the territory ceded in 1848 by Mexico) to the Louisiana Purchase (1803). The first white settlement was at Fort Laramie, on the Laramie fork of the Platte, in 1834. This fort was purchased by the American Fur Company in 1835, rebuilt by the company in 1836, and sold by it to the United States government in 1849. For many years it was an important base of operations against the Indians. Fort Bridger was built on the Black fork of Green river in 1842, but abandoned in 1853. In 1842 Frémont visited Wyoming. Prior to 1866, all armed or migratory expeditions westward, including Gen. Connor's march along the 'Bozeman trail' in 1865, had been in support of Mormon emigration, or to reach California and other opening fields of gold discovery. The inception of the Union Pacific railroad developed new necessities for the occupation of regions farther north, only to be reached by the uncertain navigation of the upper Missouri. Gold discoveries in central Montana evolved the practical fact that neither river navigation, nor the diversion of overland travel from Ogden northward, at a sharp right angle, could furnish the required facility for reaching the new field of promise, but that a new road, following the Bozeman trail, around the Big Horn Mountains and up the Yellowstone valley, would constitute a diagonal course which would shorten wagon travel by at least 300 m. During the year 1865, the Harney-Sanborn treaty guaranteed to Indians occupying that vast hunting region their undisturbed possession, provided they would not interrupt the building of the proposed railroad across the plains. All that upper region once belonged to the friendly Crow Indians, known as 'Upserokas,' or 'Absarakas,' belonging to 'the land the crows fly over,' or the 'Land of the Crows,' and this included the region watered by the Yellowstone, Big Horn, and Big Wind rivers. Northern Sioux, Arapahoes, and Cheyennes had gradually encroached upon these hunting grounds, and were hostile to white intrusion as well as to the Crow Indians themselves. These tribes, however, were summoned to meet a government commission at Laramie in May, 1866, to decide upon what terms they would permit the building of a wagon road through that country and around the Big Horn Mountains to Montana. This proposition gained new promise from the fact that during the winter and early spring of 1865-6 hostilities along the lower Platte had almost

ceased, and the Pawnees of Nebraska and Spotted Tail's Brulè Sioux were friendly to the whites.

In anticipation of successful negotiations, without conflict, Major-General John Pope, commanding the Department of the Missouri, by general order 33, reorganized the department, upon the muster-out of volunteers who served at the west during the Indian hostilities of the civil war period, and formed five military districts, the 'Minnesota,' 'Upper Missouri,' 'Platte,' 'Upper Arkansas,' and the 'Mountain District,' the last named embracing the entire field desired for the new emigrant route to the northwest. Army regiments were recruited as rapidly as possible to meet the new conditions. Col. Henry B. Carrington, of the 18th United States infantry, a three-battalion regiment, himself a brigadier-general, United States volunteers, from November, 1862, and afterward brigadier-general, United States army, retired, who was then at Fort Kearney, Nebraska, in command of the east sub-district of Nebraska, covering operations along the Platte river and the upper forks of the Republican, was detailed to command the new mountain district. His battalion, about 700 strong, started May 19, reaching Laramie, 265 m., on June 15. Old Fort Connor, changed to Fort Reno, was to be rebuilt, and after another march of 65 m., and passing Lake De Swedt, the location of Fort Phil Kearney, between the forks of Piney creek, was surveyed and established July 15. Later, 91 m. westward, Fort C. F. Smith was built upon the Big Horn river. An additional post on the upper Yellowstone was ordered, but never built, for want of troops. Col. Carrington, a practical engineer, prepared working plans for the building of Fort Phil Kearney, and in person superintended the erection of buildings, magazine, stockade, saw-mills, and all elements of a strong defensive post. Inspector-General Hazen pronounced it the 'best on the continent, except one of the British Fur Company.' Hostilities were immediate and constant. 'During six months 51 hostile demonstrations were made, incurring a loss of 150 citizens and soldiers, and over 700 head of stock.' On Dec. 8, 1866, President Johnson advised congress that treaties had been effective and that peace reigned on the plains. But in a fight on Dec. 6. Lieut. Bingham was killed, and a crisis was reached Dec. 21, 1866, when Capt. (brevet Lieut.-Col.) W. J. Fetterman, accompanied by Capt. Frederick Brown and Lieut. George W. Grummond, and 78 men, were decoyed into an ambush and slaughtered. News of the tragedy reached Washington Christmas night. This disaster, so unexpected and complete, and so needless, if 'the reinforcements and supplies repeatedly promised, but never furnished, had been received,' shocked the whole country, and the first battalion of the 18th, and other troops, long idle at Fort Laramie, were hurried to save the feeble garrison that survived. Such a wholesale and barbarous massacre in-

spired friends of the new territory to give it a name memorable in the Indian history of Pennsylvania, irrespective of some fancied Indian meaning of the word Wyoming. Official reports at the time urged retention of the name in use by the Crow Indians, and as approved by James Bridger, the guide of the expedition, and an adopted Crow chief. During August, 1867, Red Cloud again attacked a working party and was repulsed with great loss. But from lack of troops to sustain the line, Gen. Grant ordered the forts demolished. The original failure to support properly the first occupation delayed the peaceful settlement of the new territory until, after 10 years, another massacre, that of Gen. Custer and his command, compelled the government efficiently to protect the frontier against the savage tribes of the northwest.

The territorial government was organized in 1869. A constitution adopted in November, 1889, was approved by congress, and the state was admitted to the Union 1890, July 10.

The successive governors, with their terms of service, are as follows: John A. Campbell 1869-75; John M. Thayer 1875-78; John W. Hoyt 1878-82; William Hale 1882-85; Francis E. Warren 1885-6; Thomas Moonlight 1886-89; Francis E. Warren 1889 (elected United States senator 1890); Amos W. Barber (secretary of state, acting governor 1890-93; John E. Osborne 1893-95; William A. Richards 1895-99; De Forest Richards 1899-1903; Fennimore Chatterton, 1903-1905; B. B. Brooks, 1905-1911.

Population.—The Federal Census of 1900 showed that Wyoming had, with one exception, the smallest population and the smallest density to the square mile of any state in the Union. The males numbered 58,184, the females 34,347. The foreign born numbered 17,415; Indians, 1,686; negroes, 940; Chinese, 461; Japanese, 393. The largest cities were Cheyenne, 14,082; Laramie, 8,207; Rock Spring, 4,363. State population (1870) 9,118; (1880) 20,789; (1890) 60,705; (1900) 92,531.

WYOMING, UNIVERSITY OF: located at Laramie, Wyo. It was chartered by the legislature of the territory of Wyoming in 1886, and opened to students in 1887; the first state legislature in 1890 passed an act enlarging the scope of the university, and also made the State Agricultural College provided for by the national grants a part of the university organization. The state has since doubled its regular appropriation, and made several appropriations for special purposes. The university is open to women on equal terms; tuition is free except in the Department of Music. The educational policy of the university was liberal from the first; the preparatory and collegiate departments were the first established; the organization now includes (1) the Preparatory School; (2) the College of Liberal Arts; (3)

the Graduate School; (4) the Normal School; (5) the College of Agriculture and the Agricultural Experiment Station; (6) the College of Mechanical Engineering; (7) the School of Mines; (8) the School of Commerce; (9) the School of Music. The College of Liberal Arts offers a classical, a literary, and a scientific course, and confers the degree of B.S. for the scientific course without Latin, and the degree of B.A. for all other courses. In each course the work of the freshman year is required, the work of the sophomore year partially elective, and the work of the junior and senior years almost entirely elective. The Graduate School affords opportunities for advanced study, the different departments offering suitable graduate courses. The master's degrees are conferred. The regular courses in Normal School, the College of Agriculture, the College of Mechanical Engineering, and the School of Mines are five years in length, including one preparatory year; the degree of B.PED. is conferred for the completion of the normal course; the degree of B.S. for the agricultural, engineering and mining courses. There are also a one year's course in the Normal School, a course in domestic science, a one year's and a two years' agricultural course and a ranchmen's winter course in the College of Agriculture, and a winter course of six weeks in the School of Mines. The School of Commerce offers two-year courses in bookkeeping and in stenography; the School of Music a seven years' course in piano. Instruction in military science and tactics is also given. The university has organized a University Extension Association, which conducts extension lectures in all parts of the state; a Correspondence Teaching Department is also conducted, by which some of the work toward a degree may be done. The campus now occupies 40 acres in the eastern part of the city; the buildings are the Hall of Languages, the Mechanical Building, the Hall of Science, and the gymnasium; the three first mentioned are built of gray sandstone, which is found near Laramie. The library contains 16,000 volumes; the students number about 200.

The University of Wyoming, though in numbers one of the smallest of the state universities, is well equipped and maintains a high standard of scholarship, as the real head of the educational system of the state.

WYOMING VALLEY: a crescent-shaped valley in Luzerne co., Pa., traversed by the n. branch of the Susquehanna river; length 21 m. It is a fertile alluvial plain, with rich deposits of anthracite coal, and is noted for its beautiful scenery. The valley was claimed by the colony of Connecticut as early as 1753, and was first settled by people from Connecticut; the ensuing dispute between Pennsylvania and Connecticut over this territory is known as the 'Pennamite and Yankee war,' and was not finally settled till after the revolutionary war.

In 1782 a commission appointed by Congress decided in favor of Pennsylvania; an attempt was made to drive out the Connecticut settlers which led to a renewal of the war; but in 1788 Pennsylvania confirmed the titles of all actual settlers to their land, and all controversy was ended by 1800. During the revolutionary war, a large proportion of the men of the Wyoming Valley joined the Continental army; but a number of Tories were living in the valley; and in 1778, when they were joined by British troops and Indian allies, an attack was made upon the settlers who had taken refuge in Forty Fort near Wilkesbarre. The settlers did not number over 400, chiefly boys and old men; the British force, including the 700 Indians, was about 1,100. After a desperate battle fought on the 3d of July 1778, the settlers were completely defeated, about two-thirds being killed. They were forced to capitulate, and after the surrender many of the prisoners were tortured and killed by the Indians. The greater part of the inhabitants of the valley were compelled to flee to other settlements, and endured great hardships.

WYON, WILLIAM: English engraver and designer of coins and medals: b. Birmingham 1795; d. Brighton, Sussex, 1851, Oct. 29. Having won several prizes for medals offered by the society of arts, he went in 1816 to London, and was appointed second engraver at the mint, a post which he filled until the close of his life. In 1832 he was elected an associate of the Royal Academy, and in 1838 an academician, being the first of his department who had ever obtained these honors. His works, comprising coins, pattern pieces of coins not used, medals, and seals, are numerous. His coins cover a period of nearly 30 years, including the latter part of the reign of George IV., the reign of William IV., and the first 13 years of the reign of Victoria. Far more numerous than these are his war, scientific, artistic, and testimonial medals, executed from his own or from Flaxman's designs, and in the highest style of art.

WYTHE, *with*, GEORGE: signer of the Declaration of Independence: 1726-1806, June 8; b. Elizabeth City co., Va. He received the equivalent of a liberal education at home, supplemented by some study at the College of William and Mary; but, left an orphan before he was of age, he wasted much of his fortune in excesses. Reformed at the age of 30, he studied law, attained high rank in his profession, and was prominent as a member of the colonial assembly. As early as 1764, on a committee to remonstrate against the Stamp Act, he prepared a paper that went beyond the temporizing policy of his associates; and he was one of the earliest advocates of independence. From 1776, with Jefferson and Edmund Pendleton, he revised the colonial laws for the state. He was chosen speaker of the house of delegates,

and a chancery judge 1777; later, chancellor in the court of equity, and while holding this office was professor of law in William and Mary College, 1779-89. Removing to Richmond, he was in the convention that framed the constitution of the United States. He liberated his slaves, and assisted them in obtaining a livelihood. He died in Richmond. Thomas Jefferson was one of his pupils, and long afterward spoke of him in highest terms of praise as 'the honor of his own and the model of future times.' —He published *Decisions in Virginia by the High Court of Chancery, with Remarks upon Decrees of the Court of Appeals* (1795, 2d ed. 1852).

WYTHE, Joseph Henry, M.D.: educator; b. Manchester, England, 1822, Mar. 19. Coming to the United States 1835, he first prepared himself for the ministry of the Methodist Episcopal Church, and was licensed to preach 1842; but afterward studied medicine and graduated at the Pennsylvania Medical College 1853. He served as surgeon in the Union army during part of the civil war; was president of Willamette University, Oregon—where he organized its medical department—1865-69; and after again spending some time as a Methodist Episcopal preacher, he removed to San Francisco, and was chosen professor of microscopy and histology in the Medical College of the Pacific. His publications include: *The Microscopist* (1805); *Curiosities of the Microscope* (1852); *Agreement of Science and Revelation* (1883); *Easy Lessons in Vegetable Biology* (1883); and *The Science of Life* (1884).

WYTHEVILLE, Va.: town, county-seat of Wythe co.; on the Norfolk and Western railroad; 130 m. w. of Lynchburg and 215 m. s.w. of Richmond. It is in a stock-raising and mining region and has considerable lumbering interests. It has manufactories of iron works, woolen goods, and lumber products. The town has a county court-house, Trinity Hall Female College (Luth.), Wytheville Seminary (P. E.), Academy of the Visitation (R. C.), public elementary schools, and two libraries. The two state banks have a combined capital of $100,000. Pop. 2,800.

X

X, x, *ĕks:* 24th letter (19th consonant) of the Eng. alphabet, but the last letter of the Latin alphabet until B.C. 1st c., when *y* was added from the Greek. X is a double consonant, equivalent in Eng., as it was in Latin, to *ks* or *gs,* and is therefore superfluous. In form it corresponds to the Greek χ, but in power to Greek ξ. Some Roman scholars did not acknowledge the character, but wrote *cs, gs* instead; and this substitution frequently occurs in inscriptions (e.g., *ucsori,* for *uxori*). At one period of Roman literature, *xs* was often written for *x*— e.g., *saxsum, lexs.* In popular pronunciation the guttural element of the character gradually disappeared until, in the later period of the Empire, *x* was undistinguishable from *ss* or *s;* thus, inscriptions show *visit* for *vixit, milex* for *miles.* This change survives in modern Italian, which substitutes *ss* or *s* for the Latin *x* (as *sasso* = *saxum; straneo* = *extraneum,*) and uses *x* only in foreign words. In Spanish, in the beginning of words, *x* has a guttural sound, something between *ch* and *y.* In German the use of *x* is mostly confined to foreign words; in native words the sound is usually represented by *chs,* as *wachsen,* to wax or grow, though some write, e.g., *axe* for *achse.*— In algebra *x* is the usual symbol for the unknown quantity which is to be determined. As a numeral, X stands for 10, and with a dash over it for 10,000; laid horizontally (⋈), it stands for 1,000.

XALA'PA. See JALAPA.

XANTHATE, n. *zăn'thāt* [Gr. *xanthos,* and chem. termination *-ate*]: a salt of Xanthic Acid (q.v.).

XANTHEINE, n. *zăn'thē-īn* [from Gr. *zanthos,* yellow, and *-ine,* chem. termination]: name given by Frémy to the insoluble coloring matter of flowers.

XANTHELASMA, n. *zăn'thē-lăz'ma* [Gr. *xanthos,* yellow; *ĕlasma,* a plate of metal hammered out]: a disease of the skin characterized by yellow, slightly raised patches of irregular outline most common around the eyelids.

XANTHIAN, a. *zăn'thĭ-an:* pertaining to or brought from Xanthus, an anc. town of Asia Minor (see XANTHUS).

XANTHIAN MARBLES, *zăn'thĭ-an mâr'blz:* in *class. antiq.*, a large collection of marbles of various ages, from B.C. 545 onward, discovered near Xanthus, Asia Minor, 1838, and placed in the Brit. Museum, London, 1842-3.

XANTHIC, a. *zăn'thĭk* [Gr. *xanthos*, yellow]: tending toward a yellow color; yellow or yellowish. XANTHIC ACID, a heavy oily, fluid acid ($C_3H_6OS_2$), heavier than water, of penetrating, disagreeable odor, and very combustible. It is prepared by dropping carbon bisulphide into a solution of alcohol saturated while boiling with potash, until the liquid loses its alkaline character. It forms beautiful yellow salts. XANTHIC OXIDE, same as Xanthine (q.v.).

XANTHINE, n. *zăn'thĭn* [Gr. *xanthos*, yellow]: a whitish powder ($C_5H_4N_4O_2$), allied to uric acid, described first by Marcet, who regarded it as a very rare constituent of urinary calculi, and from its composition gave it the name *uric oxide*. It has been found to be a normal constituent of the human body, is a normal ingredient of human urine, and has been found in blood; in the brain, the spleen, the pancreas, and the liver of the ox; in the thymus gland of the calf; and in the muscular tissue of the horse, the ox, and of fishes; as well as in the liver of various animals; and is obtainable from guano. Calculi composed of this substance are extremely rare, are of light-brown cinnamon color, assume waxy appearance when rubbed, and consist of concentric layers easily separable from one another. Xanthine occurs in very minute quantities in the various tissues. It can be prepared artificially by action of potassium nitrite on guanine and of the sodium amalgam on uric acid. When dried, it exists as a yellowish-white powder, which assumes a glistening appearance when rubbed, and shows no signs of crystallization under the microscope. It is nearly insoluble in cold water; is soluble in alcohol and in ether; and when heated in contact with the air burns with the smell of burnt hair. Xanthine seems, both chemically and physiologically, to be intermediate between uric acid and hypoxanthine. The composition of uric acid is represented by the formula $C_5H_4N_4O_3$, that of xanthine by $C_5H_4N_4O_2$, and that of hypoxanthine by $C_5H_4N_4O$. The two former occur together, not only in urine, but in the spleen, the liver, and the brain; while Xanthine is not only invariably accompanied by larger or smaller quantities of hypoxanthine, but the latter can be made by the oxidizing action of nitric acid to yield a product from which Xanthine (instead of hypoxanthine) may be obtained by a process of reduction. Xanthine must be regarded as a higher stage of oxidation of hypoxanthine, and a product of the regressive metamorphosis of the tissues, which, in the ordinary condition of the system, is excreted in a more highly oxidized form of urea, uric acid, etc.

XANTHINOCARPIN, n. *zăn-thĭn-ō-kâr'pĭn* [from Gr. *xanthos,* yellow, and *Inocarpin* (q.v.)]: in *chem.,* a yellow coloring matter extracted from the juice which exudes from incisions made in the bark of *Inocarpus edulus,* of the order *Thymelaceæ,* and tribe *Hernandia.*

XANTHIPPE, *zăn-thĭp'pē:* wife of Socrates (q.v.): B.C. 5th century. She acquired the reputation of having been an archtermagant, doubtless not without some foundation. It ought, however, to be remembered that her naturally infirm temper must have been not a little tried by the small concern manifested by Socrates in the regulation of his domestic affairs, which appears occasionally to have made Xanthippe's domestic management very difficult. Socrates himself, it is known, had completely mastered his naturally strong appetites and passions, and had acquired a temper of perfect serenity. It is quite natural, then, that contrast-lovers and story-mongers should, as a foil, match so great a practical philosopher with a woman of such an ungovernable temper as is ascribed to his wife. The philosopher received her reproaches with such good-humored indifference that she sometimes resorted to other weapons beside her tongue; as when she finished up a tirade by sousing the philosopher, though his remark, as he moved dripping from the scene, that when Xanthippe thundered she watered, must have shown her that here, too, she was powerless. According to Plato, she really loved her husband, and he at his death committed her tenderly to the care of his friends.

XANTHITANE, n. *zăn'thĭ-tān* [Gr. *xanthos,* yellow; *-it,* connective; suff. *-ane*]: a pulverulent mineral found associated with Zircon (q.v.) at Green River, N. C.: hardness, 3.5; sp.gr. 2.7 to 3.0. Analysis shows it to consist of titanic acid, with traces of zirconia, and 12.5 per cent. of water. It results probably from the decomposition of Sphene (q.v.).

XANTHITE, n. *zăn'thīt* [from Gr. *xanthos,* yellow, and *-ite,* a mineralogical terminative]: mineral of the garnet family, occurring in small greenish-yellow grains.

XANTHO-, *zăn-thō,* or XANTH-, prefix [Gr. *xanthos,* yellow]: yellow, used as the first element of many chemical and other terms and epithets, as *xanthodont,* having yellow teeth; *xanthospermous,* yellow-seeded, etc.

XANTHOBETIC, a. *zăn-thō-bē'tĭk* [prefix *xantho-;* mod. L. *beta,* beet-root]: of or derived from beet, and having a yellow color. XANTHOBE'TIC-ACID, n., in *chem.,* an acid extracted from the root of *Beta vulgaris* (an apetalous plant of the natural order *Chenopodiaceæ*), by cold alcohol. It is a reddish-yellow mass, very hygroscopic, has a sour taste, is soluble in water and alcohol, slightly soluble in ether.

XANTHOCROI, n. plu. *zăn-thŏk'rō-ī* [Gr. *xanthocroos,* with yellow skin—from prefix *xantho-,* and Gr. *chrōs,* the

skin]: in *anthrop.*, fair whites; Huxley's name for a people distinguished by yellow or red hair, blue eyes, and fair complexion, who extended in early times from w. and central Asia into e. and central Europe. The farthest limit of the Xanthocroi n. is Iceland and the British Islands. Southwestward they are traceable through the Berber county, and in the Canary Islands. XANTHOCRO'IC, a. *-thō-krō'ĭk*, having a fair skin; of or belonging to the Xanthocroi.

XANTHOPHYLL, n. *zăn'thō-fĭl* [Gr. *xanthos*, yellow; *phullon*, a leaf]: the yellow coloring matter contained in the leaves of trees in autumn, the result of the decomposition of Chlorophyl (q.v.); also called *xanthophylline*. XANTHOPH'YLLITE, n. *-thŏf'ĭ-līt*, a mineral of a yellowish color and foliated texture, occurring in talcose schists, and allied to mica.

XANTHORHAMNINE, n. *zăn-thō-răm'nĭn* [prefix *xantho-*; Eng. *rhamnine*]: in *chem.*, yellow coloring matter ($C_{23}H_{28}O_{14}$), obtained by boiling coarsely-ground Persian berries (the fruit of *Rhamnus infectorius*, and other species of *Rhamnus:* see RHAMNACEÆ) with alcohol, filtering, and allowing the filtrate to crystallize. It forms tufts of pale yellow shining crystals, soluble in water and alcohol, insoluble in ether.

XANTHORHIZA, n. *zăn-thō-rī'za* [from prefix *xantho-*, and Gr. *rhiza*, a root]: in *bot.*, a genus of *Ranunculaceæ*. *X. apiifolia*, an undershrub, is one of the plants called yellow-root: it grows in shady places on mountains from w. N. Y. and Pa. southward. Its root and pith, and the inner layers of wood, are bright yellow, and were used by the Indians as a yellow dye. It yields a gum and a resin, both intensely bitter, as are the wood and bark. It is prescribed as a simple tonic.

XANTHORRHŒ'A. See GRASS TREE.

XANTHOSPERMOUS, a. *zăn-thō-spėr'mŭs* [prefix *xantho-*, and Gr. *sperma*, seed]: in *bot.*, having yellow seeds.

XANTHOUS, a. *zăn'thŭs* [Gr. *xanthos*, yellow]: yellow-skinned: applied to the Mongolian type of mankind.

XANTHOXYLUM, or ZANTHOXYLUM, *zăn-thŏks'ĭ-lŭm:* genus of trees and shrubs, type of the nat. order *Xanthoxylaceæ*, closely allied to *Rutaceæ*, and distinguished from it chiefly by unisexual flowers, including more than 100 known species of trees and shrubs, having opposite simple or pinnate leaves with pellucid dots, and no stipules, chiefly natives of warm climates, particularly of warm parts of America. The order is generally characterized by pungent and aromatic qualities, which are strongly developed in the genus Xanthoxylum itself. The Northern Prickly Ash (*X.* or *Z. Americanum*), shrub with axillary clusters of flowers appearing before the

leaves, with pods short-stalked, and with leaves somewhat like those of the ash, is common from Canada to Virginia, and is called TOOTHACHE TREE, from the use made of the hot acrid bark and capsules for relief of toothache. It is also in high repute in parts of the United States as a remedy for chronic rheumatism, for which it is administered in the form of a powder, in doses of ten grains to half a dram three times a day. The Southern Prickly Ash (*X.* or *Z. Carolinianum*) is a small tree on sandy coasts from Va. s., and has the flowers in a terminal cyme, and the pods sessile. Some of the species are popularly called PEPPERS in their native countries, as in India and Japan, where they are used as a substitute for pepper. The bark of *X. Americanum* is a powerful sudorific and diuretic, and other species possess similar qualities; some are febrifugal, and the seeds and unripe capsules of some are gratefully aromatic.—To the order *Xanthoxylaceæ* belong the AILANTUS (q.v.) and the WHITE IRON-WOOD (*Vepris undulata*) of the Cape of Good Hope, the wood of which is very hard and tough, and is much used for agricultural implements.

XANTHURA, n. *zăn-thū'ra* [prefix *xanth-;* Gr. *oura,* the tail]: in *ornith.,* genus of Amer. jays of beautiful and resplendent hues; there are three species, ranging from equatorial America n. to Mexico and Texas.

XANTHUS, *zăn'thŭs:* city, cap. of ancient Lycia, anciently called Arina, a city of the Tramilæ, or Solymi, the primitive inhabitants; at the s.w. corner of Asia Minor, and near the village of Kounik. From the earliest historic times to that of Crœsus, the Lycians appear to have been independent under native rulers; but after the fall of Sardis and the capture of Crœsus, the Persian conqueror Cyrus sent an army for the conquest of Lycia, led by Harpagus, B.C. 546. The most desperate resistance was made by the Lycians, and the people of Xanthus burned themselves in their citadel rather than surrender to the conqueror, only 80 families surviving the catastrophe. Reduced to a Persian satrapy, they sent 50 ships to the expedition of Xerxes against Greece, and contributed to the revenues of Persia. Little is known of the history of this town till the days of Alexander the Great. Alexander took Xanthus, which is said to have made as determined a resistance as it did on the former occasion. In the war which ensued among the successors of Alexander, Ptolemy took Xanthus from the garrison of Antigonus; and the city subsequently passed into the possession of the Ptolemies and Seleucids. After the defeat of Antiochus, it was ceded by the Romans to Rhodes, but subsequently had its liberties restored. In the civil war between Brutus and the Triumvirs, B.C. 43, Xanthus was taken by Brutus. The inhabitants a third time destroyed themselves and their families, and few survived the capture. From that time Xanthus belonged to the

Roman empire, and suffered in the earthquake in the reign of Tiberius; but Lycia did not lose all its freedom till the time of Claudius, who reduced it to a province.—Xanthus was situated 70 stadia, or 9 m., from the sea, on the left bank of the Sibres or Sibrus, the Greek Xanthus, or Yellow river, on a plateau of elevated ground, of nearly rectangular shape, the elevated parts close to the river rising 200 ft. The most remarkable edifices in the city and its vicinity, according to ancient authors, were the Sarpedonion, or Temple of Sarpedon; that of the Lycian Apollo; and Letôon, or Temple of Leto. On the elevated ground, or Acropolis, stood the so-called Harpy Tomb, and an ancient theatre of Greek workmanship; while in the other part of the city which lay to the east was a mixture of Greek and Roman buildings. The whole city and its environs contained numerous temples and tombs. The discoveries of Sir C. Fellows 1838 revealed the city of Xanthus, its temples and its monuments, and they appear to be of the following classes: 1. The sepulchres of the early inhabitants, inside the wall, in shape of square columns, with step-shaped bases, and sepulchral chamber on the summit: the most remarkable of these is the Harpy Tomb, so called from the subject of the bas-reliefs being the Harpies bearing off the daughters of Pandarus, King of Lycia—executed in a style resembling the earliest efforts of oriental Greek art. Another is notable, with a frieze of lions and hunters in Persian style, and the inscribed obelisk, with long Lycian inscription and some Greek verses, apparently of the time of Artaxerxes Longimanus, and made about B.C. 466. 2. The tombs of the age of the Persian subjection, with roof-shaped tops and ridges, and imitation of woodwork, the sepulchral chamber for the principal dead being at the summit, the others in the middle and base, the sides ornamented with reliefs of a later style of art. Of later style, but of more beautiful art, was the Ionic peristyle temple or monument of 14 columns, with a solid cella, placed on a base or pedestal, both temple and base ornamented with friezes, supposed to represent the conquest of Lycia by Harpagus, and with figures between the columns. The friezes represent hunts and feasts, the combats of Lycians and Persians, and taking of the city of Xanthus by the latter—the whole treated in a style not unlike the school of Phidias and his successors. These sculptures have been supposed to represent the exploits of Harpagus, or the suppression of the revolt of the Cilicians by a Lycian satrap, and to have been made between B.C. 450 and 387. This temple was discovered by Sir C. Fellows 1840-44.

The language found on the monuments of Lycia, written in an alphabet of 25 letters, is an Aryan dialect, distinguished by prevalence of vowels. The letters, with two exceptions, are archaic Greek, and borrowed from a form not oldest of that language. The syntax and in-

flections are Aryan or Indo-European, but many of the roots are different from the languages of that family, though certain words may be referred to well-known equivalents—as *goda*, 'lord,' to the Persian; *tedeeme*, 'son,' to the Slavonic; and *ladé*, 'wife,' to the Anglo-Saxon. Some words, too, resemble the Zend. The presence of many Greek words barbarously transcribed can also be well recognized in the different inscriptions, and a few derived from their Persian conquerors—as *gssatrape*, or 'satrap.' The inscriptions are generally short and sepulchral, and follow the well-known formula common under the Roman empire, and are sometimes accompanied by Greek versions or translations, helping to explain the Lycian. Only one inscription, recording the exploits of one of the family of the Harpagi after the battle of Eurymedon (B.C. 466), on the so-called obelisk of Xanthus, is of any length. The language seems to have lasted from about B.C. 5th century to the 1st century after Christ.—Rawlinson, *Herodotus*, I. 311, 673; *Synopsis of the Contents of the Brit. Museum*, 1855, p. 105; Fellows, *Asia Minor* (Lond. 1839); *Discoveries in Lycia* (1841); Birch in the *Archæologia*, XXX. 176-204.

XAVIER, SAINT FRANCIS. See FRANCIS XAVIER, SAINT.

XAVIER, HENRY: American horticulturist: b. Lyons, France, 1826, Mar. 26; d. Mount Vernon, N. Y., 1901, June 19. When quite young he came to this country and in 1853 settled at Mount Vernon. He imported into the United States nearly every known species of wine-producing grape vines, making many trips to Europe for this purpose, and bringing the vines from France, Spain, Italy, Germany, and Hungary.

XAVIER, JEROME: Spanish Jesuit missionary: b. Navarre; d. Goa, India, 1617. He wrote both in Latin and in Persian, and among his principal works are: *Treatise on the Mysteries of Christianity* (1600); *Life of the Apostles; History of Jesus Christ; Directory of Kings for the Government of their Subjects.*

XEBEC: a small three-masted vessel, employed in the Mediterranean, distinguished from other European vessels by the great projection of the prow and stern beyond the cut-water and stern-post. In this respect it resembles the felucca, from which it differs only in having the fore-mast square-rigged. The xebec is constructed with a narrow floor for the sake of speed, and of a great breadth, so as to be able to carry a considerable force of sail without danger of overturning.

XENIA: city, county-seat of Green co., Ohio; on the Shawnee creek, and on the Pennsylvania, the St. Louis, the Cincinnati, Hamilton and Dayton, and the Pittsburg, Cincinnati, Hamilton and Dayton railroads; 55 m. s.w. of Columbus. It is in the Little Miami valley, in the

midst of a productive farming region. It is well laid out and has good macadamized streets and enough of slope to have surface drainage. The chief manufacturing establishments are two shoe factories, one powder works, one ice factory, two machine shops, one automobile factory, brewery, one daily paper house. In 1900 (government census) Xenia had 106 manufacturing establishments, capitalized for $1,819,614 and employing 1,105 wage-earners to whom were paid annually $394,386. The cost for raw material, etc., was $2,171,360; and the value of the finished products was $3,122,797. The county court-house is in a park in the centre of the city. Other prominent buildings are the municipal building, the Ohio Soldiers' and Sailors' Orphans' Home, and several business blocks. Outside the city limits are the county infirmary and children's home. The educational institutions are Xenia Theological Seminary (United Presbyterian), opened in 1794, three high schools; Central, established in 1856, East Main Street, for colored pupils, and the Ohio Soldiers' and Sailors' Home High School; public and parish schools, a public library (building presented by Andrew Carnegie), and school libraries. Wilberforce University, in Wilberforce suburb, is for colored pupils. It has departments of law, theology, science, and literature, and a training school for nurses. There are 16 churches: Five Baptist, three Methodist, three Presbyterian, and one each of Roman Catholic, Disciples of Christ, Protestant Episcopal, Lutheran, and Reformed. The two banks have a combined capital of $200,000, and total resources about $1,300,000. The government is vested in a mayor, boards of public service and safety, and a council of seven members, elected biennially. Xenia was settled in Apr. 1803, by John Marshall. In 1808 it was incorporated. Pop. 1910) 8,706.

XENOCRATES, *zē-nŏk'ra-tēz:* ancient philosopher: B.C. 396-314; b. Chalcedon. At an early age he attached himself to Plato, and rose to such esteem for proficiency in philosophy and high moral character, that he was thought worthy of succeeding Speusippus, Plato's successor, in the presidency of the Academy. This post he filled creditably for 25 years. He wrote numerous treatises on dialectics, physics, and ethics, and drew with unusual precision the boundaries between these three departments of philosophy. Of these works, merely the titles have been preserved; and what is known of his doctrines is gathered only from fragmentary notices of them in various authors. He introduced into the Academy, to a greater degree than before, the mystic Pythagorean doctrine of numbers in connection with the *ideas* of Plato. In his ethical teaching he aimed at making the Platonic doctrines more directly applicable to ordinary life in individual cases, and pitched his standard of excellence very high. He held that virtue is in itself valuable, while other things are valuable only con-

ditionally, and that it extended to thoughts as well as actions. He was himself of irreproachable character, of well-balanced mind, and temperate in his habits, without cynicism. His alleged conversion of the youthful debauchee Polemo into an earnest, virtuous man, and his disregard for wealth, as shown by his reported refusal of the offers of Philip and Alexander, are often mentioned.

XENODOCHEUM, n. *zĕn-ō-dō-kē'ŭm,* or XENODOCHIUM, n. *zĕn-ō-dō-kī'ŭm* [Gr. *xenodocheion*—from *xenos,* a stranger; *dechomai,* to receive]: in *Gr. antiq.,* a building for the reception of strangers; also in modern usage, a guest-room or guest-house in a monastery.

XENON: a gaseous chemical element discovered by Ramsey and Travers (1898) in the residue left after the evaporation of a large quantity of liquid air. Symbol X; atomic weight 128. It is an inert chemical element having a spectrum somewhat resembling argon.

XENOPELTIS, n. *zĕn-ō-pĕl'tĭs* [from Gr. *xenos,* strange, and *peltē,* a shield]: in *zool.,* a genus of snakes or serpents, typical of the family *Xenopeltidæ.* There is but one species, *Xenopeltis unicolor* (*Tartrix xenopeltis*), a curious nocturnal carnivorous snake, ranging from Penang to Cambodia, and through the Malay archipelago to Celebes.

XENOPHANES, *zē-nŏf'a-nēz,* of Colophon: reputed founder of the Eleatic School of Philosophy: b. at Colophon, in Asia Minor, probably about B.C. 569; d. (as inferred from some passages in his writings) at the age of about 92. He passed his late years at Elea (whence adj. *Eleatic*), in Lucania. He composed many poems, historical, didactic, and elegiac, which have perished, except a few fragments. He used his poetry to disseminate his philosophical tenets. He is alleged to be the first to maintain the Eleatic doctrine of the oneness of the universe (see ELEATIC SCHOOL); and recognizing clearly the unity and perfection of the deity, he attacked the prevalent mythology and the practice of attributing to the godhead a human form and human weaknesses. His speculations are skeptical in their tendency, and appear to have had great influence on succeeding philosophers. His explanations of physical phenomena were crude; but one is recorded in which he has anticipated modern geology: from the shells and marine petrifactions found on mountains and in quarries, he inferred that the surface of the earth had risen gradually out of the sea.

XENOPHON, *zĕn'ō-fŏn:* Greek soldier, historian, and philosopher: about B.C. 430-357 or later; b. Athens; of the knightly order. He early became a pupil of Socrates, and is said to have been saved from death by that philosopher at the battle of Delium, though recent investigations show that Xenophon was too young to be in

that battle. At the age of about 30 he joined the expedition of the younger Cyrus against his elder brother, Artaxerxes Mnemon, King of Persia. After the battle of Cunaxa, and the treacherous massacre of the Greek generals, Xenophon bore a most important part in the adventurous retreat known in history as the Retreat of the Ten Thousand (see TEN THOUSAND, RETREAT OF THE); and it was mainly his courage, tact, and conduct that gave it success. After his return to Asia Minor, Xenophon incorporated his forces with a Lacedæmonian army which had crossed into Asia to wage war with the Persian satraps; and leading a portion of them on a pillaging expedition, he amassed wealth enough to enable him to live the life of a country gentleman. Before retiring, he served under Agesilaus, the Spartan general, against the Persians; and at Coronea fought against his own countrymen, the Athenians. Sentence of banishment had been previously passed on him at Athens, probably for his share in the Cyrean expedition. His sympathies were entirely Spartan. He soon afterward settled at Scillus, a small town near Olympia, in Elis, under Spartan protection, where he lived more than 20 years, occupying himself with hunting, agriculture, and writing. He is not mentioned as having ever returned to Athens, though his sentence of banishment was repealed, and his two sons were in the Athenian division which aided the Spartans at Mantinea. At last Xenophon was driven from his retreat at Scillus by the Eleans, and took refuge in Corinth, where, probably, he died. His works are numerous, and, to judge by their titles and number, all extant. His style is simple, elegant, though rather monotonous and deficient in vigor. As a philosopher he holds no very high rank. He had excellent practical talents, and was a humane, sensible, religious man; but seems to have had neither genius nor taste for speculative philosophy. Modern researches tend to establish the accuracy of his historical, geographical, and ethnological statements. His principal works are the *Anabasis*, or narrative of Cyrus's expedition with the Retreat of the Ten Thousand; a History of Greece in continuation of Thucydides; the *Cyropædia*, or education of Cyrus the Elder—a sort of political romance, in which Cyrus is drawn as the model of a wise and good ruler: in this work, Xenophon clearly shows his preference of a well-regulated monarchy to the democracy of Athens. He wrote, besides, the Reminiscences (*Memorabilia*) of Socrates, a series of dialogues intended to refute the charges on which that philosopher was executed; also treatises on Hunting, on the Horse, the Revenues of Athens, and Domestic Economy.

XENOPHON OF EPHESUS (XENOPHON THE YOUNGER): Greek writer who flourished in the 2d century A.D. One work of his has been preserved, a story

in five books, called *Ephasiaca;* or *The Loves of Abrocomas and Anthia.*

XENOS, Stefanos Theodoros: Greek author. From 1855 he was a merchant and general broker in London, and in 1858 was naturalized as a British citizen. He published: *The Devil in Turkey* (1850), a three-volume English translation from the author's unpublished Greek manuscript; in Greek, *The Heroine of the Greek Revolution* (1861), translated as *Andronike* (1897); *East and West: A Diplomatic History of the Annexation of the Ionian Islands to the Kingdom of Greece* (1865); and *Depredations: or Overend, Gurney and Co. and the Greek and Oriental Steam Navigation Company* (1869).

XEN'OTIME: a mineral occurring in crystals of the same forms as zircon. It is essentially an yttrium phosphate, YPO_4, but much erbium is frequently present, and also sometimes the cerium metals, and small quantities of thorium and silicon. It is usually found in minute crystals of resinous or vitreous lustre, yellow or brown color, and having a hardness of 4 to 5 and specific gravity of about 4.5. It occurs as an accessory constituent in many granites (see Derby, in Am. J. Sc. 41, 308, 1891), in large crystals in the granitic rocks of Norway, in the auriferous gravels of North Carolina and Georgia, and in choice crystals in the gneiss of New York city. When obtainable in sufficient quantities it will be an important ore of yttria and erbia.

XERASIA, n. *zē-ra'si-ă* [Gr. *xērasiā,* dryness—from *xēros,* dry]: in *med.,* a disease of the scalp characterized by dryness.

XERES, Francisco: Spanish historian: b. Seville about 1500; date of death unknown. He accompanied Pizarro, as his secretary, to Peru, about 1530, and of that expedition wrote a detailed history, entitled *A True Account of the Conquest of Peru* (1547). The work was translated into Italian by Ramusio, and into French by Ternaux-Compans and is still valued as a source of information.

XERES, or Jerez, de la Frontera, Spain: a town in the province of Cadiz, on the Guadalete, 15 m. n.n.e. of Cadiz, in a beautiful and fertile plain. Its manufactures are unimportant; but the trade, of which the staples are corn and wine, is very important. The wine is widely known as the popular sherry, and is largely exported. Near this town a battle was fought between the Moors and Goths in 711, in which Roderick, the last king of the Goths in Spain, lost his life. Pop. (1901) 60,846.

XERIFF, n. *zĕr'ĭf* [Turk]: a gold coin formerly current in Egypt and Turkey, value about $2.27; a name used in Morocco for the ducat.

XERODERMA, n. *zē'rō-dėr'mă* [Gr. *xēros,* dry; *derma,*

skin]: in *med.*, a dry and parched state of the skin which in its severest form is known by the name of *ichthyosis*, or fish-skin disease.

XERODES, n. *zē-rō'dēz* [Gr. *xēros*, dry]: a tumor attended with dryness.

XEROPHAGY, n. *zĕ-rŏf'ă-jĭ* [Gr. *xēros*, dry; *phagein*, to eat]: the habit of eating dry food only.

XEROPHILE, n. *zē-rō-fĭl* [Gr. *xēros*, dry; *philĕō*, I love]: in *bot.*, a plant which requires a large amount of heat and but little moisture. XEROPHILOUS, a. *zē-rŏf'ĭ-lŭs*, of or pertaining to such plants.

XEROPHYTES, *zĕr'ō-fīts:* plants which have guarded themselves by structural means against excessive transpiration. The term was originally applied to plants living in dry and sandy soil, or on rocks, and to those inhabiting deserts; but it is now extended to plants existing in localities where, for one reason or another, they can not readily obtain water, as in the case of beach plants and epiphytes, and have consequently adapted themselves to prevent the waste of the moisture which they have. This result is obtained in various ways. In some, the transpiring surface is greatly reduced, and the foliage is nearly or wholly dispensed with, the stems themselves taking its place, as in switch plants and cacti; and this habit is frequently combined with the storage of water in succulent tissues. Other plants, like the eucalyptus trees predominating in the dry forests of Australia, by a vertical arrangement of their foliage, or a similar disposition of the branches themselves, when foliage is wanting, as it is in the *Casuarinas*, avoid presenting broad surfaces to the sun and hot winds. Some xerophytic plants close their leaves just before the dry season; the whole existence of others begins and ends during the continuance of a rainy season; and in the bulbous and tuberous plants we see still another common arrangement for passing the dreaded dry months, the plants growing vigorously and completing their above-ground existence, while the weather is still favorable, and storing up food in their roots or rootstocks, so that they may rest uninjured in the ground during the heated term, and be ready to spring into activity as soon as the rains begin. An extensive development of ligneous tissue is characteristic of xerophytes, and so also are such modifications of tissue as the matted hairs, mineral, waxy and varnish-like encrustations on the epidermis, the closing or concealing of stomata, etc.

XERXES, *zĕrks'ēz*, I., King of Persia: reigned B.C. 485-464; d. B.C. 464; eldest son of Darius and his second wife, Atossa, daughter of Cyrus. He was appointed successor by his father, in preference to Artabazanes, his eldest son by his first wife. Darius died B.C. 485, in the midst of his preparations for a third expedition against

Greece. Xerxes, after having subdued the rebellious Egyptians, gave his whole attention to completing the preparations begun by his father, which occupied nearly four years. Immense hordes of men were gathered from all parts of the vast Persian empire, and an enormous fleet was furnished by the Phœnicans to Persia. A bridge of boats, a mile in length, under the superintendence of Egyptians and Phœnicians, was built across the Hellespont. The bridge, however, was destroyed by a storm, on which Xerxes is said to have beheaded the engineers, and to have ordered 300 lashes to be administered to the rebellious sea, and a set of fetters to be cast into it. Another bridge, of a double line of boats, was built; and a canal was cut through Mt. Athos, at the point of the peninsula of Acte, in Macedonia, on which the fleet of Mardonius had been wrecked B.C. 492. The preparations were completed B.C. 481, and in the autumn Xerxes arrived at Sardis, where he wintered. In the spring of the following year, the vast assemblage began to march toward the Hellespont; and, according to Herodotus, seven days and nights were occupied in their march across the bridge. After crossing the Hellespont, the march was continued along the Thracian coast toward Doriscus, on the Hebrus, where a halt was made on a large plain, and the army numbered. The fleet drew up near to Doriscus. According to Herodotus, the whole number of fighting men, military and naval, amounted to nearly 2,500,000, and the fleet consisted of 1,207 ships of war, besides 3,000 smaller vessels. These numbers were considerably increased during the march between Doriscus and Thermopylæ by the Thracians, Macedonians, Magnesians, and other nations through whose territories Xerxes passed on his way to Greece. Herodotus supposes that the number of camp-followers, exclusive of eunuchs and women, would amount to more than that of the fighting-men; so that, according to him, the whole number of people assembled on this occasion would be considerably over 6,000,000. This number is doubtless greatly exaggerated; still, it cannot be doubted that this was one of the greatest multitudes of men ever brought together for any purpose under the sun. Grote, who discredits the immense numbers given by Herodotus, nevertheless says: 'We may well believe that the numbers of Xerxes were greater than were ever assembled [on any other occasion] in ancient times, or perhaps at any known epoch of history.' This immense force moved on without resistance through submissive nations till it reached Thermopylæ (q.v.), where it was brought to a stand by the army of Leonidas (q.v.). Although the Greeks were entirely defeated and slain, it was not without heavy loss to the Persians. On the same day, and on the third day afterward, the Persian fleet, which had previously suffered severely from a storm, was defeated with heavy loss by the Greeks off Cape Artemisium, in

Eubœa. Xerxes continued his march on to Athens through Phocis, which he laid waste, and Bœotia, whose inhabitants joined him, except those of Platæa and Thespia, which cities he burned. A detachment which he sent to attack Delphi met signal defeat. When Xerxes arrived at Athens (in the summer of 480, three months after crossing the Hellespont), he found the city deserted, the Athenians having sent their families to Trœzen, Ægina, and Salamis. Athens was destroyed. Meantime the two fleets had sailed round from Eubœa and taken up their positions in the narrow strait between Salamis and the Attic coast, where the famous naval battle of Salamnis took place (B.C. 480, Sept.). See SALAMIS XERXES. Xerxes witnessed the fight from a lofty throne which he had caused to be erected on one of the slopes of Mount Ægaleus,

'The rocky brow
Which looks o'er sea-born Salamis.'

Xerxes was apparently confounded at the unexpected and inglorious result of all his mighty preparations for the overwhelming of Greece; and, becoming alarmed for his personal safety, fled, under an escort of 60,000 men, with all haste toward the Hellespont, which he reached in 45 days. The bridge of boats having been again destroyed by a storm, he crossed over to the Asiatic coast in a vessel. Mardonius was left with 300,000 men to carry on operations in Greece. In B.C. 479 the Greeks defeated Mardonius in the famous battle of Platæa (q.v.), and on the same day gained another victory over the Persians at Mycale, in Ionia. Next year (B.C. 478) the Persians lost their last possession in Europe by the capture of Sestos, on the Hellespont. The war was continued a few years longer, though the struggle was now virtually at an end. Little more is known of the personal history of Xerxes, except that (B.C. 464) he was murdered by Artabanus, who aspired to the throne; and was succeeded by his son Artaxerxes. From all that is known of Xerxes, he appears to have been utterly ignoble in character, vainglorious, licentious, cruel, cowardly—the very type of the worst kind of Eastern potentate. His history would be scarcely worth recording except for its connection with Greek history. His famous invasion was undertaken apparently for no other purpose than to gratify the vanity of a weak mind which was delighted with the idea of being able to assemble at one time 'ships by thousands' and 'men in nations,' who were at the mercy of his unprincipled caprice.

XIMENES (or JIMENES) DE CISNEROS, *zĭ-mē'nēz*, Sp. *che-mā'nĕs dā thēs-nā'rōs*, FRANCISCO; in Spain commonly called DE CISNEROS: Spanish statesman, archbishop, and cardinal: 1436-1517, Nov. 8; b. Torrelaguna, in Castile; of humble family. He was educated at Alcalá de Henares, at Salamanca, and finally at Rome,

where, having entered priest's orders, he obtained from the pope a provisional or prospective nomination to a prebend in the cathedral of Toledo. The archbishop, resisting the papal claim of 'provisor,' refused to admit Ximenes, and on his persisting in his claim, put him in prison, where he was detained for a long time. On his release, he was named vicar-general of Cardinal Mendoza at Siguença; but he gave up this preferment, and entered the Franciscan order 1482. His reputation for piety and learning led the queen, Isabella, to choose him, 1492, for her confessor; and three years afterward to name him archbishop of Toledo—a dignity which he refused until he received an express command from the pope. Having yielded in the end, he continued as archbishop the life of mortification and austerity which he had practiced in his monastery; and he applied to purposes of religion, charity, and public utility the whole of the princely revenues of his see. As confessor and confidential adviser of the queen, Xerxes, during the lifetime of Isabella, was the guiding spirit of Spanish affairs; and on her death, 1504, he held the balance between the parties of Ferdinand and of Philip of Burgundy, husband of Joanna, heiress of the crown. On the death of Philip, 1506, Ximenes was appointed regent, in consequence of the incapacity of Joanna and the absence of Ferdinand, and conducted the affairs of the kingdom through a critical time with consummate skill and success. In 1507 he was created cardinal; and in the following year he organized, at his own expense, and accompanied as commander, the celebrated expedition of 10,000 foot and 4,000 horse, for the conquest of Oran, on the African coast. Ferdinand died 1516, Jan., and on his death-bed named Ximenes regent of Spain till the arrival of his grandson Charles, and though the grandees had organized an opposition as well to Ximenes as to the royal authority, Ximenes, by his prompt and able dispositions, awed them into submission; and subsequently, by the same exercise of vigor and determination, quelled the incipient revolt of Navarre. In order to the better consolidation of the royal authority in Spain, Ximenes urged very strongly the speedy visit of Charles, who still lingered in his Flemish principality; but it was not till after the lapse of a year and a half that the king decided on his journey; and meanwhile the enemies of Ximenes had so worked on his jealousy and pride, that he took the ungracious and ungrateful course of dismissing his faithful, but, as he feared, too powerful servant. Ximenes, now more than 80 years of age, had set out to meet the king; and though laboring under great infirmities, continued his journey, when he was seized with a mortal illness at Branguillas, near Aranda de Duero, where he died.

As statesman and administrator, the reputation of Cardinal Ximenes is deservedly of the very highest. The

social and political revolution which he effected in breaking down the feudal power of the nobles has often been compared with the analogous change wrought in France by Richelieu. But the revolution of Ximenes was, at least in its results, rather in the interest of the people than, like that of Cardinal Richelieu, of the crown; and while it freed the sovereign from the unworthy position of dependence on the nobility, it established the municipalities and the communal representatives in the possession of certain well-defined and substantial privileges and immunities. Ximenes, as an administrator of affairs, was bold, sternly inflexible, disregardful of private interests, either his own or others. The times were corrupt: the clergy were deeply immoral: but Ximenes's life was above reproach. His munificence as a patron of religion, of letters, and of art, has been the theme of praise in every history of his time. The University of Alcalá de Henares, which he planned, organized, erected, and endowed, was a marvel of enlightened munificence in such an age, and may compare advantageously with even the most princely foundations of the most enlightened times. His Complutensian (q.v.) Polyglot, besides being the first of its class, was, considering the resources of the period, perhaps the grandest in conception among the projects of its own order; and the perseverance with which, during the fifteen years devoted to its preparation, he watched and directed its progress, evinces its origin from a genuine love of sacred learning, rather than from a passing impulse of literary enthusiasm. The cost of this gigantic undertaking amounted, on the whole, to 80,000 ducats. His expenditure on churches, hospitals, schools, convents, and other works of religion and benevolence, was on a scale of corresponding munificence. He maintained 30 poor persons daily at his own cost, and he regularly set apart one-half of his income to the uses of charity.—See Hefele's *Der Cardinal Ximenes und die kirchlichen Zustände Spaniens* (Tübingen 1851); Prescott's *Ferdinand and Isabella.*

XIMENES DE QUESADA, Gonzalo: Spanish explorer and conqueror: b. Granada about 1495; d. Mariquita, New Granada, 1579, Feb. 16. He came to America in 1535 as a judicial functionary in the suite of Pedro Fernandez de Lugo, governor of the province of Santa Marta, who chose him to head an expedition against the Chibchas, supposed to number more than 2,000,000 souls, on the great plains of Tunja and Bogota, and the neighboring regions about the head-waters of the river Magdalena. He set out 1536, April 6, from Santa Marta, but at the end of eight months had made no more than 450 miles. After great hardships the expedition reached the mountains and in the following March progress was resumed.

The first Indians he met were so terrified by the sight of his horses that they instantly submitted. Approaching at Tunja the court of one of the great chiefs of the Chibchas, he was allowed to enter the palace, but was treacherously attacked as he was about to embrace the chief. The chief was taken, after much slaughter, and Ximenes became possessed of vast riches. From Tunja he marched upon Iraca, the sacred city of the nation. Here two Spanish soldiers, in pursuit of plunder, accidentally set fire to the great temple of the sun, which had been captured by Ximenes, and it perished with the city after burning several days. Returning toward Tunja, he fought a desperate battle at Borja against 12,000 natives, whom he defeated, after which he made treaties with several caciques, who voluntarily submitted. A usurping chief was then proclaimed king of Spain, but was required to deliver the treasures of his predecessor to the Spaniards. After a short imprisonment he promised within forty days to fill a room with gold and emeralds, but not keeping his promise, was put to death with cruel tortures. In 1538, Aug. 6, Ximenes founded the city of Santa Fé de Bogota.

He was presently joined by Benalcazar, the lieutenant of Pizarro, and Frederman, who presently conspired against Ximenes, but without much success. The three then returned to Europe to lay their claims before Charles V., but while Benalcazar was made governor of Popayan, Frederman and Ximenes gained nothing. Later, however, Ximenes was made marshal of New Granada, and returning to Bogota in 1551, seems to have protected the people against the rapacity of Spanish officials. About 1561 he was named by the Spanish government *adelantado,* or governor-in-chief of the kingdom of New Granada, and induced to fit out an expedition in search of El Dorado, beyond the territories of Pauto and Papamene. To this enterprise he devoted three years, spending immense sums in fitting it out, but returning with only a handful of followers. In 1572 he founded the city of Santa Agueda, 21 m. from Mariquita. He died of leprosy, and by his will declared himself poor and forbade the erection of any but the simplest monument over his grave. His remains were removed to Bogota in 1597. He left a manuscript work entitled *Sermones* and a *Compendio historial,* both of which are lost.

XIME'NIA: a genus of *Olacacineæ,* represented by large shrubs or small trees, often spinous. Leaves entire, leathery; calyx very small, petals four, hairy inside; stamens eight, ovary with four one-seeded cells. *X. americana,* the false sandalwood, is a straggling Indian shrub, or low spreading tree; producing dull-white fragrant flowers, smelling like cloves, succeeded by small, oval, red or yellow pulpy fruits, an inch long, aromatic, but somewhat astringent. They contain a white globose

nut with a kernel which tastes like a filbert. Its wood is very tough and heavy. This shrub is known in Florida as the hog-plum or wild lime, and in the West Indies as mountain or seaside plum.

XINGÚ: a river of Brazil, one of the chief tributaries of the Amazon. It is formed by the junction of several head-streams which rise near lat. 15° S., lon. 55° W. Chief of these is the Tanitatoaba, which flows from a small lake about 75 m. in circumference. After flowing n. for 1,200 m. through a densely forested and little explored region, the Xingu forms a large lake which is connected with the Amazon estuary by a number of deltaic channels 240 m. w. of Pará. Steamers ascend the river to the Cataract and Fall of Itamaracá. The river was unexplored until 1884-7, when it was descended from Cuyabá by Von den Steinen.

XIPHISTERNUM, n. *zĭf'ĭ-stėr'nŭm* [Gr. *xiphos,* a sword; *sternon,* the breast]: in *zool.,* the inferior or posterior segment of the sternum, corresponding to the xiphoid cartilage of human anatomy.

XIPHODONTIDÆ: a family of primitive forerunners of the ruminants, whose remains occur in the Upper Eocene rocks of western Europe. Some of them are the largest and most slender artiodactyls of their age, and the only feet hitherto discovered are two-toed, with mere rudiments of the lateral digits.

XIPHOID, a. *zĭf'oyd* [Gr. *xiphos,* a sword; *eidos,* resemblance]: in *anat.,* sword shaped; ensiform; applied to the cartilage of the sternum.

XIPHOPHYLLOUS, a. *zĭ-fŏf'ĭl-lŭs* [Gr. *xiphos,* a sword; *phullon,* a leaf]: in *bot.,* having sword-shaped leaves.

X-RAYS, or RŒNTGEN RAYS: a form of radiant energy originating in the highly-exhausted vacuum tubes of Crookes, and resembling light in certain respects, though differing from it notably in many ways. The X-rays are propagated in straight lines, and are capable of affecting the sensitive plates that are employed in photography, so that subsequent development will cause the affected portions to blacken, just as though the plate had been subjected to the action of light. The X-rays are practically invisible to the eye. They are capable, however, of exciting brilliant fluorescence in certain minerals, and their presence may, by this means, be made distinctly evident to the eye. The X-rays were discovered in 1895 by Prof. Wilhelm Konrad Rœntgen, of the University of Würzburg; the name being given by him to signify that the ultimate nature of the radiation was unknown, 'X' being a letter that is commonly used in algebraic operations to represent an unknown quantity.

In the nearly-perfect vacuums employed by Crookes, the high-tension electrical discharge does not take place

between the electrodes in the form of a spark, but, when the tension of the gas in the tube is sufficiently low, it assumes the form of a luminous streamer, proceeding across the tube from the negative electrode (or 'cathode'), in a direction perpendicular to the surface of this electrode. The luminous shaft that proceeds outward from the cathode in this manner is called the 'cathode ray,' and it exhibits many interesting phenomena. In a general way, it may be said to deport itself as though it were composed of a storm of tiny electrified projectiles, which are negatively charged by contact with the cathode, and are then violently repelled from the cathode in a direction perpendicular to its surface. Many experimenters have devoted their attention to the cathode ray, in the endeavor to discover its true nature; and among these experimenters was Lenard, a young German physicist, who was assistant to Dr. Heinrich Hertz, at Bonn, at the time of the latter's death in 1894. Lenard appears to have been impressed with the idea that it is possible to make the cathode ray emerge from the vacuum tube, into the air. It would seem that the projectile explanation offered above precludes any such possibility; but Lenard found that if the vacuum tube is provided with a very thin pane of aluminum foil at the place where the cathode ray strikes it, this ray can apparently pass through the aluminum so as to emerge into the air outside of the tube. In Lenard's apparatus the vacuum tube is entirely enclosed by opaque material, so that the light from the interior of the tube may not affect the eye; the thin pane of aluminum being placed, as indicated above, at the place where the cathode ray within the tube strikes the wall of the tube. When the proper precautions are taken against the escape of any ordinary light from the interior of the tube, the cathode ray, in a darkened room, can be seen to emerge from the tube through the aluminum, taking the form of a divergent and diffuse luminous brush, which, as Lenard showed, can be deflected by a magnet. Lenard also found that the emerging brush affects a photographic plate, and he investigated the relative transparencies (or opacities) of various substances for it. Rœntgen repeated certain of the experiments of Crookes, Hittorff, Lenard, and others, and made the further discovery that vacuum tubes also generate another kind of radiant energy, which he called 'X-rays,' and which resemble the cathode ray in some respects, but differ from it in not being deflected by a magnet, and in not being distinctly visible to the eye. The X-ray and the cathode ray are both capable of exciting strong fluorescence in certain crystalline substances which are subjected to their influence; and in working with the X-rays it is customary to make use of fluorescent screens, which are coated with barium platinocyanide, or with calcium tungstate, or with some other substance in which the fluorescent effects of the X-rays

are very pronounced. A screen of this kind, when exposed to the action of the X-rays, becomes luminous, and the intensity of the luminosity is proportional to the intensity of the radiation striking the screen. Thus when a screen of this kind is glowing with uniform brilliance, and an object (such as a piece of lead or glass) which is more or less opaque to the rays is interposed between the screen and the tube from which the X-rays proceed, the object so interposed shields the screen, over a certain area, from the exciting X-rays, so that a comparatively dark region is produced, as though the opaque object were casting a shadow. The relative opacities of various substances can be studied in this manner, by merely interposing the objects whose opacities are to be tested, and noting the depths of the apparent shadows that are produced. Glass is found to be much less transparent to the X-rays than an equal thickness of aluminum or of wood, and, in general, it may be said that the opacity of any substance is approximately proportional to the density of the substance. When a portion of the human body is interposed between the tube and the fluorescent screen, the bones, having a greater density than the flesh that surrounds them, cast shadows upon the screen, so that their images can be seen, dark, against a much lighter background. In comparatively thin parts of the anatomy, such as the hand, very good shadowgraphs can thus be had of the bones; but when the X-rays have to traverse thicker parts of the body, such as the chest, the shadowgraphs are far less distinct. The ribs can be seen through the entire body, though somewhat imperfectly, and the liver and heart can also be indistinctly perceived. Tumors and other morbid growths can likewise be traced to some extent, as well as tubercular areas in the lungs, and certain other pathological conditions. (The haziness of the images that are obtained when the X-rays traverse thick tissues is due, no doubt, to 'secondary radiation,' as explained below.) Owing to the great density of lead, bullets that are embedded in the flesh can frequently be located with considerable accuracy, and in the surgical treatment of bullet wounds the X-rays are therefore often highly useful.

Permanent images of the shadowgraphs that are produced by the X-rays can easily be had by substituting a sensitive photographic plate for the fluorescent screen referred to above; the image being allowed to fall upon the photographic plate, which is afterwards developed in the usual manner.

There has been some controversy about the origin of the X-rays;—that is, about the part of the tube from which they emanate. Rœntgen believed that they originate in the region where the cathode ray is stopped by the wall of the tube, or by some other obstacle; and although this view has been disputed by other experimenters, it is now believed to be correct. That is, when

By courtesy of Sinclair Tousey, M.D., New York.

PICTURE OF A SWELLING IN THE SHOULDER TAKEN THROUGH CLOTHING.

Note the corset stays which are opaque to the rays.

the cathode ray strikes against the glass wall of the containing tube, the X-rays appear to originate at this point on the wall; and when the tube is so constructed that the cathode ray strikes directly against the anode, then the X-rays proceed from the anode. It has been found, indeed, that the radiation is much more intense when the design of the tube is such as to cause the cathode ray to impinge directly upon the anode, and in most of the modern tubes for the production of X-rays this construction is adopted. It is observed that when an X-ray tube has been operated for a considerable time, the vacuum within it becomes more and more perfect, so that it is eventually difficult to force through the tube a discharge sufficient to generate the rays with the desired intensity. Moreover, the penetrative character of the X-rays given off by a tube appears to depend to a considerable extent upon the degree of perfection of the vacuum, as was observed by Rœntgen himself. For these reasons, most of the X-ray tubes are made, at the present time, with regulable vacuums, the main tube being provided with a side bulb, with which it communicates by means of a tube. The glass walls of the auxiliary bulb become covered with a thin layer of condensed air; and when, through the operation of the apparatus, the vacuum in the main tube has become so highly perfected that the discharge passes with difficulty, the walls of the auxiliary bulb are warmed by a gas flame or otherwise, so that a portion of the air that is held condensed upon them is driven off into the interior of the bulb, and thence into the main tube, until the vacuum becomes reduced sufficiently to permit of the satisfactory passage of the discharge.

The experimental investigation of the X-rays is beset with serious difficulties, because these rays possess properties so different from those of ordinary light that few of the methods that are employed for the study of light can be applied to them. For example, the X-rays cannot be refracted, and they are apparently not capable of regular reflection. Hence they cannot be focused in any way. Furthermore, they cannot be made to exhibit diffraction, interference, or polarization. Many of the methods employed in the study of light are based upon one or more of these phenomena; and hence, the phenomena themselves being absent in the case of the X-rays, little or no help in the investigation of this form of radiation can be had from our previous experience with light.

When the X-rays traverse a solid which is more or less transparent to them, the distinctness of the shadow-like images that are seen upon the fluorescent screen, or which are recorded upon the photographic plate, diminishes with the thickness of the object through which the rays pass. The images become diffuse with increasing thickness in such a way as to suggest that the X-rays do not really travel in straight lines, but that they are capable

of bending about an obstacle so as to influence the screen, or the sensitive plate, behind the obstacle. A more careful study of the phenomenon indicates, however, that the diffuseness of the image under these circumstances is due to the fact that each particle in the course of the X-rays acts as a centre of 'secondary radiation,' from which X-rays again emanate, though with reduced intensity, in all directions. The passage of X-rays through a body may therefore be compared with the passage of ordinary light through a light mist, each particle of the mist acting, in a similar manner, partly as a mere obstacle, and partly as a new centre of radiation, so that the shadows that are observed in such a case are diffuse and indefinite.

The discovery of the X-rays led to much speculation among physicists as to their ultimate physical nature. In the theory of light it was long ago pointed out that the disturbance which takes place in the ether when a light-wave travels through that medium must be such that the displacements that occur, whatever their nature may be, occur only in directions that are perpendicular to the direction in which the ray itself progresses. There appeared to be no phenomenon whose existence corresponded to the existence of a wave of compression and rarefaction in the ether, such as occurs in air when a sound-wave passes; and in order to explain the absence of this longitudinal wave of rarefaction and compression it was necessary, in the elastic-solid theory of light, to assume that the ether is absolutely incompressible, or to make certain other special assumptions with respect to its nature. Upon the discovery of the X-rays, it was therefore natural to inquire if they do not constitute the missing phenomenon corresponding to a compressive disturbance in the ether. This idea, although it was an attractive one, and agreed well with the absence of polarization in the X-rays, gradually fell out of favor, giving way temporarily to the hypothesis that the X-rays are similar in nature to ordinary light, but that they are of exceedingly short wave-length—much shorter, in fact, than any form of radiation previously known. There was much to be said in favor of this latter hypothesis, for it was known that the phenomena that would be manifested by light of wave-lengths exceedingly short in comparison with the average distances between the molecules of transparent bodies would be very different from those that are observed in connection with light of longer wave-lengths. Even if the wave-length of the X-rays were very short, however, it would be natural to expect that interference phenomena of some sort might still be observable; and yet no such phenomena could be detected. What is probably the true explanation of the nature of the X-rays was given almost simultaneously by Stokes, Lehmann, and J. J. Thomson. The 'pulsation theory' advanced by these physicists assumes that the

X-rays do not, like light, consist of *trains of waves*, in which a series of similar waves follow one another in rapid succession and at regular intervals, but that they consist, instead, of a series of electrical pulsations through the ether, following one another without any regularity. A mathematical analysis of the consequences of their theory indicates that it is in entire harmony with the observed absence of refraction, reflection, polarization, interference, and diffraction. The cathode ray within the vacuum tube is believed to consist of a storm of tiny molecular fragments, or electrons (q.v.), the velocities of which may be as great as 40,000 m. per second. When one of these charged particles comes in contact with a solid wall or other obstacle, the abrupt change that is produced in its motion causes a violent alteration in the electrical stress that exists in the ether immediately about the point of collision, and the result is, that this point of collision serves as a centre from which a pulsation of electrical disturbance radiates outward. A fresh pulsation will therefore be produced every time a charged electron collides with the solid obstacle, and hence, since there is no regularity in the collisions, there will also be no regularity in the resulting ethereal pulsations. This view of the nature of the X-rays accords with all the known phenomena, even with the demonstrated absence of the X-rays from ordinary sunlight. This last fact was tested and verified by experiments upon Pike's Peak where a sensitive photographic plate was exposed for several months to the action of the sunlight, protected by wrappings that were impervious to light, but which would transmit, freely, any X-rays that might happen to be present. The elevated position was selected in order that any absorptive action that the earth's atmosphere might exert upon the rays should be reduced to the smallest practicable amount. Subsequent development of the exposed plate showed no evidence of the action of X-rays upon it.

In the course of experiments with the X-rays, it was soon found that they are capable of producing more or less marked physiological effects. See X-RAYS IN MEDICINE AND SURGERY.

X-RAYS IN MEDICINE AND SURGERY: X-rays are used in medicine and surgery for two distinct purposes—as an aid to diagnosis, and for the treatment of diseases. These rays were discovered by Professor Wilhelm Konrad Roentgen, of Würzburg, Germany, in 1895, and a scientific discussion of their nature will be found in the article X-RAYS.

The apparatus for making observations with the X-rays consists of an induction coil, a focus tube, and a phosphorescence screen. The focus tube is a glass globe from which the air has been exhausted, usually pear-shaped for convenience, and having two poles of

metal sealed into opposite sides of the globe, but protruding on the outside sufficiently for the attachment of the wires connected with an induction coil. The phosphorescence screen is a plate covered with some platino-cyanide, mounted in the end of a box, the opposite end of which fits over the eyes of the observer, and of the right length for focussing on the plate. For making an observation, such as that upon some portion of the body, the operator turns on the current of electricity, points the screen at the tube, and interposes the part to be observed. In this way he sees a shadow-picture in which the bones appear to be nearly opaque objects, while the soft structures are more or less faintly outlined. If a permanent photographic record is desired an ordinary photographic plate, in its sealed paper wrappings, is placed in the position of the screen, and exposed to the rays for a few seconds, or even minutes, according to conditions. The negative may then be developed and printed from in the same manner as any ordinary photographic plate.

For diagnostic purposes in locating foreign substances in the body, and the position of the bones in fractures and dislocations, the use of the X-ray in surgery has been revolutionary. The location of bullets, needles, fragments of metal, etc., deeply embedded in the tissues, that formerly could only be determined by the dangerous and painful process of probing or cutting, and which then were likely to prove elusive, can now be determined with absolute certainty, and without danger, pain, or inconvenience to the patient. The same is true in detecting obscure fractures and dislocations of bones, which can be observed before and after the setting almost as well as if the surrounding tissues were transparent. The subsequent healing process can be watched by the surgeon without removing the dressings. Thus setting broken bones and reducing dislocations are no longer matters for scientific guesswork.

In the diagnosis of such foreign bodies as gall stones, and calcareous deposits in the kidneys, which frequently produce symptoms indistinguishable from those arising from other causes, X-rays are now indispensable. A fragment of stone passing from the kidney along the tube of the ureter on the right side, for example, may cause symptoms closely resembling an attack of appendicitis. A few seconds' use of the X-ray apparatus in such cases may avert a dangerous, painful, and unnecessary operation, as most renal stones contain sufficient lime to make them opaque to the rays, and show as black spots on the negative or screen.

The X-rays are also of great value in determining the presence and location of tumors in the abdominal and thoracic cavities. Making diagnoses in such cases is far more difficult than determining the location of metal or mineral substances, as most tumors have little opacity to the rays, and appear merely as faint outlines on the

By courtesy of Sinclair Tousey, M.D., New York.

1. Showing diseased condition of the fifth metacarpal bone in the hand of a child, near the base of the little finger. There appears to be very little bony substance in the bones of the wrist.

2. Picture showing pieces of metal embedded in the flesh, indicated by the small black dots near the end of the fingers.

screen. In the hands of experts, however, a correct diagnosis is often possible.

X-rays have a very definite effect upon healthy and pathological tissues of the body, and their application in this field has been almost as revolutionary as in diagnosis. The danger attending their use for this purpose lies in the possibility of inflicting deep and destructive burns. Skilful operators have learned to avert this danger, however, largely by confining the action of the rays, regulating the distance of the instrument from the patient, and keeping the length of time for making the exposure well within definitely determined danger limits. Carlessness in these matters may result in serious burns, gangrenes, formation of epitheliomas, and even loss of limbs, for both operator and patient.

Briefly stated X-rays are used (1) for their anodyne effect; (2) to cause atrophy of certain appendages of the skin; (3) to destroy or retard the growth of certain bacteria in the tissues; (4) to stimulate metabolism and promote healthy action; (5) to destroy certain pathological tissues known as cancers. By their use the pain of some neuralgias, and some forms of rheumatism, is often relieved temporarily, and even permanently, by a few applications. In many instances superficial hairs, which are often disfiguring and annoying, are removed without great discomfort. Superficial ulcers caused by pyogenic bacteria, which are very resistant to ordinary forms of treatment, sometimes yield quickly to the rays, as do such annoying diseases as sycosis, acne, and favus. Many cases of the annoying disease known as psoriasis, are greatly benefited, and some absolutely cured—a thing seldom accomplished by any other form of treatment. Psoriasis is a chronic, non-contagious skin disease, which shows in persistent, slightly elevated dry patches, chiefly on the elbows, knees, and scalp. It is most disfiguring and has long been the bane of physicians and patients.

One of the most signal victories for the X-rays is shown in the treatment of the variety of tuberculosis of the skin known as *lupus vulgaris*. This disease generally takes the form of repulsive growths and sores on the neck or face, which resist all the older methods of treatment. The X-rays act by destroying the bacteria and pathological tissue in the growth, effecting a cure in remarkably short time in many cases.

In another form of tubercular affection which causes swelling of the glands, such as those in the neck and axilla, the use of the X-rays is very beneficial, and is particularly so in healing the sinuses and preventing recurrence, when the glands have been removed. In tuberculosis of the synovial membrane of the knee joint, complete cures are sometimes effected; but even in incurable cases the rays almost invariably alleviate the pain, which is often excruciating. In cases of pulmonary tuberculosis, where the bacilli are deeply embedded in

the lung tissue, the X-rays have only slight effect, but are sometimes used beneficially in conjunction with other forms of treatment.

The most important use of the X-rays in treating diseases, and the one that has given most startling and satisfactory results, is in certain forms of cancerous growths, where actual cures are sometimes made. The honor of first using the rays for this purpose belongs to the Swedish physician, Steinbeck, in 1899. The action of the rays seem to be peculiarly effective in treating the form of surface cancers known as epitheliomas, which are common to the facial regions. As high as 90 per cent. of such cases are reported as having been cured by some physicians; and this estimate is not based upon selected cases which could in all probability be cured with the knife, but from a list that included cases in which the cancers were in such positions, and in such advanced stages, that surgical treatment was impossible. Even in the relatively simple cases the patient was saved the pain and horror of the knife.

In the form of cancer known as carcinoma of the breast, which is of far more serious nature, the result of X-ray treatment is less satisfactory; but even in such cases from 15 to 18 per cent. seem to have been cured by some operators. Even where a cure is not effected the progress of the disease is usually greatly retarded, and sometimes held in check for months or even years. In other cases where the growth has been removed, the rays are used as a prophylactic in preventing recurrence. In cases of deep-seated carcinomas, such as those at the base of the tongue and in the abdomen, the rays do not stop the progress of the disease, although frequently they relieve the pain. In the treatment of other forms of malignant growths, such as sarcomas, the results have been practically the same as in the case of the carcinomas. In some cases where the use of the knife is imperative, but where the condition of the patient does not admit of immediate operation, the X-rays are used successfully to hold the disease in check until the time for operating.

Just why the X-rays cure in one case of malignant growth, and fail to have any effect upon a similar growth in the same location in another, has not yet been determined. It appears to be due to the difference in susceptibility of certain persons; but the true explanation will probably remain a mystery until the more important fact of just how the rays act curatively upon any malignant growth is determined.

XUARES, Gaspar: Paraguayan botanist, historian, and biographer: b. Santiago del Estero, Paraguay, 17—; d. Rome, Italy, 1804. Entering the order of Jesuits, he devoted himself to teaching philosophy and theology; and after the suppression of his order he removed to Italy, where he occupied himself with botanical re-

searches. He wrote: *History of Buenos Ayres,* and *Dissertations,* which remain in MS.; *Life of St. Francis Xavier;* etc.

XULLA, or Zorella, Islands, East Indies: a group in the Molucca sea, s. of the Molucca passage, and e. of Celebes. The largest islands of the group are Taliabo, Mangola, and Xulla Besi. The first is about 40 m. long.

XYLANDER, Guilielmus: German scholar: b. Augsburg 1532, Aug. 20; d. Heidelberg 1576, Feb. 10. His real name was Holzmann. He was educated at Tübingen and Basel and in 1558 was appointed professor of Greek at Heidelberg. His numerous Latin translations from the Greek have been of much service to later students.

XYLANTHRAX, n. *zī-lăn'thrăks* [Gr. *xulon,* wood; *anthrax,* coal]: wood-coal or charcoal, as distinguished from lithanthrax or mineral coal; a lignite or fossil wood.

XYLEM, n. *zī'lĕm* [Gr. *xulon,* wood]: the woody portion of a vascular bundle, in contradistinction to the phloem or bast portion.

XYLENE: in chemistry, three isomeric hydrocarbons are known by this general name, orthoxylene, metaxylene, and paraxylene. They all have the composition $C_6H_4(CH_3)_2$ and are dimethyl derivatives of benzene. Commercial xylene or zylol, found in coal tar, is a mixture of the above three. It is a colorless, oily liquid, boiling above 140° C., not soluble in water, and used as a solvent in various chemical operations.

XYLIA, n. *zī'lĭ-a* [Gr. *xulon,* wood]: in *bot.,* genus of trees of the tribe *Eumimoscæ,* having sessile, sickle-shaped, compressed, woody legumes, with partitions between the seeds. *X. dolabriformis* (*Mimosa xylocarpa* of Roxburgh), the ironwood tree of Pegu and Arracan, yields a red resin, and oil is expressed from its seeds. The wood is very durable; it has been used in India and Burmah for railway ties, piles, beams of bridges, telegraph-poles, the handles of agricultural implements, boat-buildings, etc.

XYLITE, n. *zī'līt* [Gr. *xulon,* wood]: a peculiar liquid found in pyroxylic spirit; in *mineralogy,* a variety of amianthus having a wool-like texture, better known as *mountain-wood, rockwood,* etc.

XYLO-, *zī'lō* [Gr. *xulon,* wood]: prefix in compound words meaning *woody, of wood,* or *relating to wood,* as, *xylo*graphy, wood-engraving.

XYLOBALSAMUM, n. *zī-lō-băl'sa-mŭm* [Gr. *xulon,* wood; *balsamon,* balsam]: the wood of the balsam-tree; a balsam obtained by decoction of the twigs and leaves of *Amyris gileadensis* in water. See Balsam or Balm of Gilead.

XYLOCARP, n. *zī'lō-kârp* [Gr. *xulon,* wood; *karpos,* fruit]: in *bot.,* a hard and woody fruit. Xy'locar'pous,

a. *-kâr'pŭs,* bearing fruit which becomes hard and woody.

XYLOCOPA, n. *zī-lŏk'ō-pa* [Gr. *xŭlokopos,* hewing or felling wood; *xulon,* wood; *kopē,* a cutting]: in *entom.,* a genus of solitary bees, with sharp-pointed mandibles by which they bore holes in timber; hence sometimes called carpenter-bees. In several species the females are black, the males a bright yellow. For *X. violacea,* see BEE.

XYLOGRAPHY, n. *zī-lŏg'ră-fĭ* [Gr. *xulon,* wood; *graphō,* I write]: the act or art of cutting figures or designs in wood; wood-engraving. XYLOG'RAPHER, n. *-fėr,* one who engraves on wood. XYLOGRAPHIC, a. *zī'lō-grăf'ĭk,* or XY'LOGRAPH'ICAL, a. *-ĭ-kăl,* pertaining to xylography or wood-engraving; engraved on wood. XY'LOGRAPH, n. *-lō-grăf,* an engraving on wood; a print or impression from such an engraving. See WOOD-ENGRAVING.

XYLOID, a. *zī'loyd* [Gr. *xulon,* wood; *eidos,* resemblance]: resembling or having the nature of wood; woody.

XYLOIDIN, n. *zī-loyd'ĭn* [Gr. *xulon,* wood; *eidos,* resemblance]: explosive starch; a white inodorous and tasteless powder ($C_6H_9NO_7$), insoluble in alcohol, ether, chloroform, benzene, water, etc., resulting from the action of strong nitric acid on starch or woody fibre. It is related to gun-cotton, and it explodes when struck, but with less violence than gun-cotton; it melts when heated; takes fire at 356° F., and burns brightly. By the action of reducing agents, it is again converted into starch.

XYLOL, n. *zī'lōl* [from *xyl(on),* wood, and Latin *ol(eum)* oil] dimethyl benzene, $C_6H_4(CH_3)_2$; a colorless, oily, aromatic fluid with strong refractive power, and boiling at about 282° F.; obtained from coal-naphtha and wood-spirit. Mixed with toluol, cumol, and cymol, xylol was found among the oils separated from crude wood-spirit by addition of water, long before it was completely isolated; called also *Xylene.*

XYLONITE, n. *zī'lŏn-īt* [Gr. *xulon,* wood]: a kind of compressed gun-cotton, resembling ivory, used in making combs and other articles; Celluloid (q.v.).

XYLOPAL, n. *zī'lō-pal* [prefix, *xylo-,* and *opal*]: in *mineral.,* same as wood-opal.

XYLOPHAGA, *zī-lŏf'a-ga* [Gr., wood-eaters]: a family of *Coleoptera,* of section *Tetramera,* nearly resembling weevils, but differing from them in having no beak. They have short antennæ, thickened toward the tips, and sometimes leafy from the base. The species are numerous and are arranged in many genera. They live mostly in wood, on which they feed, both in their perfect and larval states. Some are very destructive to trees and timber. See BARK BEETLE; SCOLYTUS. Some of the xylophaga live in fungi, and feed on them.

XYLOPHAGI, n. plu. *zī-lŏf'ă-jī* [Gr. *xulon,* wood;

phagein, to eat]: wood-eaters. XYLOPH'AGANS, n. plu. *-găns,* insects whose larvæ devour the wood of the trees in which they are hatched. XYLOPH'AGOUS, a. *-gŭs,* eating or feeding on wood.

XYLOPHILAN, n. *zī-lŏf'ĭ-lăn* [Gr. *xulon,* wood; *philĕō,* I love]: a beetle that lives on decayed wood.

XYLOPHONE, n. *zī'lō-fōn* or *zĭl'ō-fōn* [Gr. *xulon,* wood; *phonē,* voice, sound]: musical instrument consisting of a series of graduated bars of wood, sometimes supported on bands of straw (hence sometimes called 'straw-fiddle'), and played with small hammers. The xylophone has been used to test the vibrative properties of the different kinds of wood and of the different metals.

XYLO'PIA: a genus of anonaceous trees or shrubs, natives of tropical regions, with coriaceous leaves, commonly two-ranked, and flowers in axillary clusters or solitary. The corollas have six petals, the outer three elongated, boat-shaped, curving over and partially enclosing the other three. The receptacle is conical, with the stamens outside and the carpels in its excavated interior. The fruits are elongated berries. *X. sericea,* the pindaïba of Rio Janeiro, bears a highly aromatic fruit, which may be used as pepper, with which it agrees in its flavor. Good cordage is made from the fibres of its bark. The wood, bark, and berries of *X. glabra,* the bitter wood of the West Indies, taste like orange seeds, and impart a similar flavor to the wild pigeons which feed on them. It is said to be useful in colic and for creating an appetite. Martius believes the fruit of *X. grandiflora* to constitute a valuable febrifuge used by the South American Indians. The dry, black, and quill-like fruits of *X. aromatica* form the *Piper æthiopicum* of commerce, used as pepper by the West African negroes, as they are aromatic. They are sold in the native markets as a stimulant and condiment. *X. polycarpa* is the yellow dye-tree of tropical Africa, with a bitter bark, that contains berberine, and which yields a yellow dye, of extensive use; it is also employed for the treatment of bad ulcers.

XYLORETINE, n. *zī'lŏ-rē'tĭn* [Gr. *xulon,* wood; *rhētinē,* resin]: a sub-fossil resinous substance, found in connection with the pine-trunks of certain peat-mosses.

XY'RIS. See YELLOW-EYED GRASS.

XYST, n. *zĭst,* or XYST'OS, n. *-ŏs,* or XYST'US, *-ŭs* [L. *xystus*—from Gr. *xustos,* a covered portico with a polished floor—from *xuō,* I scrape]: in *anc. arch.,* a sort of covered portico or open court, of great length in proportion to the width, in which the athletes performed their exercises.

XYSTARCH, n. *zĭs'târk* [Gr. *xustos; archō,* I rule]: in *Gr. antiq.,* an Athenian officer who presided over the gymnastic exercises of the Xyst (q.v.).

XYSTER, n. *zĭs'tẽr* [Gr.—from *xuō*, I rub, I scrape]: in *surg.*, an instrument for scraping bones.

XY'SYTHRUS: tenth king of Babylon, and the Babylonian Noah of the Deluge, according to the Chaldean historian Berosus, portions of whose work survive in Eusebius. The account agrees with that of Genesis in respect to a prophetic warning, a ship built, its resting on a mountain (in this tradition in Koordistan), and the erection of an altar for sacrifice; but the King Xysythrus, after the sacrifice, disappeared among clouds. Berosus speaks of the ship as still existing, and of people taking away asphaltum from it as a charm; and this is spoken of also by Abydenus, who found an account of the Deluge in the archives of the Medes and Babylonians, and who calls the king Seisithrus. According to Abydenus, birds were liberated from the ship and came back with mud on their feet. The cuneiform inscriptions, found and translated of late years, give substantially the same traditions. Berosus says that those who were saved in the ship returned and rebuilt Babylon, which had a succession of 86 kings before the conquest by the Medes.

X. Y. Z. CORRESPONDENCE: in United States history, the name given to the despatches of the three commissioners to France in 1797-8, Marshall, Pinckney, and Gerry. These commissioners reached Paris in October, 1797, but were refused recognition by the Directory. They were, however, notified by the secretary of the Marquis de Tallyrand, minister for foreign affairs, that agents would be sent to conclude negotiations. The first of these, Hottinguer, stated that a 'loan' of $1,200,000 would be the necessary means of placating the Directory: the other two, Bellamy and Hauteval, urged that in case the American government would buy at par stock amounting to 32,000,000 livres, but whose market-value was really about one-half that amount, the transaction would be viewed as a loan. The intimation was that in default of money war would ensue. These terms were promptly rejected. The despatches sent by the commissioners were submitted in copy to Congress, X, Y.. and Z., having been substituted for the respective names of the French agents. A great stir was caused at the time. Preparations for hostilities were made, and war on the sea actually broke out.

Y

Y, y, *wī:* 25th letter, and last but one, of the English alphabet; derived from the Greek γ (*υ*). It had no place in the earlier Latin alphabet, and came into use by Roman writers in the time of Cicero in spelling words borrowed from the Greek. In the Greek of the classical age, *υ* (γ) no longer retained its pristine power (It. *u* or Eng. *oo*), but had degenerated into a sound like the French *u*, or even nearer to the French *i* (*ee*); it could not, therefore, be represented by the Roman *u* or *v*, which had remained (and still remains in modern Italian) undegenerated; thus it became appended to the Roman alphabet as a new character. Its use in native Latin words, as *sylva* for *silva, satyra* for *satira,* is an error of modern editors. Italian has no *y,* but uses *i* instead, as *sinfonia,* symphony. The other modern languages of Europe have retained it in spelling words of Greek origin, and some of them substitute it for *i* in native words, generally in a very capricious manner. German orthography has recently been purged of this abuse; and in Dutch, where it had always the sound of English *i* (*ai*), the double character *ij* is now written. In English, in addition to its value as a vowel (equivalent to *i*), *y* is used to represent the semi-consonantal power of *i* or *j* (see I and J) in the beginning of a word and before another vowel, as *yoke* = Lat. *iugum* or *jugum* = AS. *iuc;* young = AS. *iong* = Ger. *jung.* It has been suggested that the practice of writing *y* at the end of a word instead of *i,* while we replace it by *i* on adding a syllable (e.g., *lovely, lovelier*), may have arisen, like the habit of giving a tail to the last unit of the Roman numerals (e.g., ij, iiij), in the wish to give a kind of finish to the word and please the eye. This would-be antique spelling *yᵉ, yᵗ,* for *the, that,* is a blunder, arising from mistaking the AS. *þ* (= *th*) for a *y.* As a mediæval Roman numeral, $\underline{Y}$ stood for 150, and with a horizontal stroke over it ($\overline{\underline{Y}}$) for 150,000. In chem., *Y* is the symbol used for *Yttrium,* and is in algebra the second of the variables or unknown quantities.

Y- [AS. *ge-,* an extremely common prefix, both of verbs and nouns]: a prefix sometimes written *i, e,* and *a,* used in Middle English, without, however, increasing or modifying the meaning of the word; it has the sound of *ē,* as in YCLAD, *ē-klăd′,* clad. YCLEPT, *ē-klĕpt′,* called. YDRAD, *ē-drăd′,* dreaded.

Y: something shaped like the letter y; one of the forked pieces which support the pivots of the telescope

of a theodolite, or the like; a two-way pipe or coupling; a switch-connection on a railway, used instead of a turntable for reversing the direction of a locomotive, train of cars, or the like. It consists of a short track at right angles to the main track, and connected with it by two curved arms (which with the short track form the letter Y). A locomotive or train switched head on by one of these arms to the short track and then backed by the other arm to the main track will head in the opposite direction when it arrives there.

YABLONOI MOUNTAINS, *yâ-blō-noy':* range in n.e. Asia, dividing the basin of the Amur from that of the Lena. Some peaks are between 7,000 and 8,000 ft. high, but parts of the ridge are but a kind of plateau. The Stanovoi Mts. are a continuation of the Yablonoi Mountains.

YAC'ARE. See JACARE; ALLIGATOR.

YACCA-WOOD, n. *yak'kă-:* the timber of *Podocarpus coriacĕa,* much used in the West Indies for cabinet-work.

YACHT, n. *yŏt* [Dut. *jagt,* a light ship fit to give chase with—from *jagten,* to chase, to hurry: Ger. *jähe,* quick]: a light and fast-sailing vessel, used for pleasure-trips, racing, and the like. V. to sail in a pacht, YACHT'ER, n. *-ĕr,* one sailing a yacht. YACHT'ING, n. pleasure-sailing in a yacht: ADJ. relating to yachts and their use. YACHTSMAN, n. *yŏts'măn,* one who sails or cruises in a yacht.

YACHTS AND YACHTING: The term yacht is not easily defined, for it is now applied to vessels of widely different size and build, propelled either by means of sails or by steam, electricity, or other similar power, and used for many different purposes, such as racing, cruising, exploration, state ceremonial, etc. Sailing yachts may be of any rig suited to their size, chiefly cutters, schooners, ketches, yawls, and luggers.

History.—The word *yacht* is of Dutch origin, being from the Dutch *jagt,* a swift vessel, from *jagen,* to chase, to hunt. It seems to have been introduced into England in 1660 when the Dutch presented Charles II. with a yacht. The first recorded yacht race was that between Charles II. and his brother, the Duke of York, which took place on the Thames in 1661, but from that date none is on record till 1796, when ten boats started on a 50-mile race in the Bristol Channel under the auspices of the Bristol Sailing Society. Yacht-racing is a characteristic development of the 19th century, especially of its latter half. For a long period, extending well into the 19th century, yachting was closely connected with naval defense, and private yachts were generally constructed to carry guns and be used in case of need for naval purposes. Private individuals of means were thus able to contribute to national defense not only directly by forming a kind of minor volunteer fleet, but also

indirectly by leading the way in the development of naval architecture. In 1832 the *Emerald*, the fastest cutter in the Royal navy, was defeated in a racing and sailing contest with the *Paddy from Cork*, a yacht belonging to a member of the famous Water Club of Cork, and in consequence the head of the government school of naval architecture in Portsmouth was deputed to measure several private yachts with a view to improving the construction of vessels for the navy. In the following year the *Water Witch*, a vessel similar to the 10-gun brigs of the navy, built for Lord Belfast, proved herself faster than any vessel in the Royal navy, and better than any of her kind for purposes of warfare. Of the many yacht clubs now in existence only the Royal Cork Yacht Club and the Royal Thames Yacht Club can trace their history back to a period before the last century. The premier yacht club of Great Britain, the Royal Yacht Squadron, with headquarters at Cowes, dates back to 1815 in its formal capacity. In 1820 it became the Royal Yacht Club, and in 1833 its name was changed by royal order to Royal Yacht Squadron. The Royal Northern Yacht Club, with headquarters at Rothesay, was founded in 1824. The remaining clubs in Great Britain number altogether about 120, of which about one-third are Royal.

American Clubs.—In the United States there are more than 200 yacht clubs scattered throughout the country, having about 4,000 yachts. But of these vessels only about 700 are above 40 ft. in length, and only a little over half of these are propelled by steam. The New York Yacht Club, the oldest in the United States, having been organized in 1844, has a membership of over 1,000 but there are only about 140 steam yachts and launches on its list. Thus the sailing yacht is the normal type of American pleasure craft. There are two distinct kinds of yacht, whether propelled by sail or steam—the racing yacht, in which comfort is sacrificed for speed, and the commodious, well-proportioned cruiser yacht; but even in the latter every modern discovery tending to increased speed is incorporated. Popular interest in yachts may be dated from the victory of the yacht *America* in the international contest around the Isle of Wight in 1851. She represented certain American ideas in the shape of her hull and the fit of her sail, which were immediately copied in England. From that day the history of sailing yachts has been a steady improvement in speed through the efforts of such yachtsmen as James Gordon Bennett, General Charles T. Paine, C. O. Iselin, J. Pierpont Morgan, and William K. Vanderbilt, and such designers as the late Edward Burgess, A. Cary Smith, J. Beaver Webb, and Nat G. Herreshoff. The last named was the author of both the latest international cup-racers, *Vigilant* and *Defender*. The same designers have won golden opinions for their work in the field of steam-yachting, as have also Gustav Hillmann, Lewis Nixon, C. D.

Mosher, and Charles M. Seabury; and American yards can now turn out steel steam-yachts equal to the best made in England.

Racing Yachts.—The designing and construction of a racing yacht require no small amount of scientific and technical knowledge besides large experience, and consequently the yachts entered for the leading races, at least in the higher classes, are the work of a very few designers and builders. In a yacht intended for racing, speed is the primary essential, and to it accommodation and convenience are in large measure sacrificed. Moreover, a designer has to take into account the circumstances under which his vessel is to be run, or the competitors which she has to meet, because a yacht that does well in fine weather and a smooth sea will usually be of little account in boisterous weather and a rough sea. The rating rules of the Yacht Racing Association (formed in 1875) also condition the designer's work, and it will be necessary, therefore, to give some account of them here. The object of rating regulations is to secure that all competitors shall start on practically even terms in any given race, and this is achieved by the classification of yachts in well-defined groups according to certain measurementas, and also, especially among large yachts, by means of time allowances corresponding to differences in these measurements. In the early days of racing, yachts were grouped according to tonnage, the tonnage being determined, as for other vessels at that time, by multiplying the length by the breadth and the depth and dividing by 96 (afterward 94). This was replaced by what is called builder's measurement or old measurement, which is still in use for some purposes connected with yachts. These rules were found to have the effect of encouraging the construction of yachts of very narrow beam, especially after about 1871, when designers learned the use of outside ballast on the keel. A great change was effected in 1886, when the length-and-sail-area rule came into force, and yachts were classified according to rating determined by the formula Length $\times$ Sail Area in sq. ft.

$$\frac{\text{Length} \times \text{Sail Area in sq. ft.}}{6000}$$

The present linear rating rule was adopted in 1896, but it cannot be said that finality has yet been reached. Linear rating is expressed in feet, and is determined by the formula

$$\frac{\text{Length} \times .75\,\text{Girth} \times .5\sqrt{\text{Sail Area}}}{2}$$

For the smaller vessels wood is the cheapest and lightest material, but larger ones are made of steel, or of steel frames with a wooden skin, the latter class being called composite. Other metals, notably aluminum, have also been used for the construction of yachts. Practically all large composite vessels, and also many small

ones, have a copper sheathing to protect the submerged parts of the wood from the action of the water. The sails of racing yachts are generally made of cotton, mostly of the finest Egyptian variety; but ramie fibre is coming into use for this purpose, and a mixed cotton and ramie material is also in use. Up till a comparatively recent date flax was generally used for the sails of racing yachts, though it does not produce a sufficiently smooth and close-textured cloth.

Speed.—The speed of a racing yacht of given size may be regarded as the result of a compromise between stability, which determines sail-carrying power, and resistance. The stability depends upon well-known hydrodynamic principles, and may be roughly said to be determined by breadth of beam, the lowness of the centre of gravity of the vessel, and the quantity and position of the ballast. Resistance at low speeds is due chiefly to surface or skin friction, but at higher speeds it is principally caused by wave-making, a phenomenon too intricate to be discussed here. An increase in beam increases stability, but at the same time increases skin friction. Wave resistance is less in vessels whose displacement is obtained mainly by breadth than in those where displacement is principally determined by depth. Various means of lowering the centre of gravity have been adopted with advantage, such as the use of hollow masts and booms, the use of aluminum for the upper part of the vessel's sides, etc. Stone ballast was used in the early days of yachting, but it was superseded by iron, and that in turn by lead. The lead ballast was afterward carried on the keel, and, later, the keel consisted of a plate of lead projecting far below the hull. At present the deep fin-keel is of some other metal than lead, and carries the lead at its base in a cigar-shaped bulb. Surface friction is lessened by making the submerged surface smooth, either by coating it with varnish, or by covering it with polished metal, or in some similar way. The chief names in the evolution of the present shape or lines of yachts from the old 'cod's head and mackerel's tail' varieties are those of Scott Russell and John Hyslop, the latter an American. The curve of cross sections for the fore part should be nearly a curve of versed sines, and that for the hinder part a trochoid; but various considerations may modify these theoretical forms. If two vessels differ in nothing but length, the longer will be the faster. The center-board keel, consisting of a plate of iron which can be raised or lowered according to circumstances, was of British invention, but is now most characteristic of American racing yachts.

Racing Rules.—The ordinary rules of the road at sea apply in the main to yacht-racing. Yachts sailing with the wind free must clear those sailing close-hauled. Yachts on the port tack must give way to those on the starboard tack, and an overtaking yacht must clear the

overtaken vessel. The start in a yacht race is now always a flying one, but prior to about 1860 yachts started from anchor. Frequently much depends upon the start, and accordingly maneuvering for initial position is of considerable importance. At the start, as throughout the race, the skipper counts for a good deal. The course to be traversed is marked out by buoys, light-ships, or flag-boats. The time allowances corresponding to differences in rating are determined in accordance with a scale prepared by the Yacht Racing Association. Vessels always start together, the time allowance being made at the end of the race. Handicapping is also practiced to some extent in yacht-racing.

American and International Yachting.—The *Jefferson*, built in 1801, is regarded as the first yacht built in America; but the first American yachts of importance were those designed by George Steers, notably the *America*. In 1866 three American yachts, *Henrietta*, *Fleetwing*, and *Vesta*, raced across the Atlantic, the first-named winning the race with a time of 13 days, 21 hours, 55 minutes. In 1870 the English yacht *Cambria*, which had challenged for the America Cup, beat the American *Dauntless* in a transatlantic race, but she was beaten by the *Magic* and several other boats in the race for the cup. In 1873 Mr. Ashbury, who owned the *Cambria*, again challenged for the cup, but his yacht *Livonia* was defeated by the New York Club's vessels *Columbia* and *Sappho*. Major Charles Gifford, a Canadian, challenged for the America Cup in 1876 with the *Countess of Dufferin*, but his yacht was beaten by the defender, *Madeline*. Another Canadian vessel, the *Atlanta*, contested the cup in 1881, her opponent being the *Mischief*, but the result was the same as before. Sir Richard Sutton sent the next challenge in 1885, and his yacht *Genesta* was pitted against the *Puritan*, but without success. The *Puritan* was designed by Edward Burgess, as was also the *Mayflower*, which successfully defended the cup against the English *Galatea* in 1886. The *Thistle* met another Burgess boat, the *Volunteer*, in the same contest the following year, but, like all preceding challengers, she failed to gain the cup. Mr. Herreshoff scored his first great success as a designer with *Gloriana* in 1891, and soon afterward he produced the *Vigilant*, which defeated *Valkyrie II.* in the America Cup contest of 1893. The cup contest of 1895 between Lord Dunraven's *Valkyrie III.* and the American *Defender* had an unsatisfactory result. Two races were awarded to the latter on purely technical grounds, and in consequence Lord Dunraven withdrew from the competition. In the same year a Canadian yacht named *Canada* defeated the United States yacht *Vancedor* in a competition for an international cup. The next challenges for the America Cup came from Sir Thomas Lipton, whose yachts *Shamrock I.* and *Shamrock II.* were beaten by the American *Columbia* in 1899 and 1901 respectively.

Sir Thomas again challenged for the cup in 1902 and 1903, and lost to the Americans.

Steam Yachts.—The use of steam has been a great factor in the increase of interest in private yachts. The cost of steam yachts varies widely even without taking into account the expenditures for furnishings. A yacht 160 ft. in length may be built for $60,000, while one of the 300-ft. boats, the largest type, will cost from $400,000 to $500,000. One of the most superbly fitted private yachts, though not of the largest class, is the *Niagara,* owned by Howard Gould. It cost $500,000, and requires $10,000 a month to keep it in commission. The *Margarita II.,* built for Anthony J. Drexel, the Philadelphia banker, was large and finely equipped. William K. Vanderbilt owns the *Valiant,* 332 ft. long, and probably the largest American private yacht afloat. The *Mayflower* and *Nahma,* owned by the Goelets, were built on the Clyde. The most magnificent private yachts owned in Europe are the *Hohenzollern,* belonging to the Emperor of Germany, which visited New York in February, March 1902, and the *Atmah,* built for Baron Edmond de Rothschild.

The development of the gasoline motor led to an enormous growth of the fleet of motor boats of all descriptions, and while the sailing yacht was not displaced, it was only the out and out racer that did not have some auxiliary power. The certainty of being able to make trips and return in spite of wind and tide has increased pleasure sailing to an extraordinary extent, and during the season of 1909 there were upwards of 10,000 yachts of all kinds in American waters.

YAD'KIN River. Upper course of the Great Pedee River (q.v.).

YAD'RINTSEF, Nikolai Michailovitch, Russian author: b. Siberia 1842; d. Barnaul, Altai Mts., 1894, June 19. Accused in youth of conspiring for the independence of Siberia, he was exiled to Archangel, but later was permitted to return and was appointed on the staff of Gov.-Gen. Kaznakof. Between 1865 and 1875 he traveled extensively in Siberia, publishing the results of his explorations and in 1882 founded the *Eastern Review,* a strong, popular weekly devoted to the interests of Asiatic Russia. In 1891-2 he made careful explorations in Mongolia, discovering the ruins of the ancient capital of the Tartar Khans, and forming archæological collections of great value. In 1893 he visited the United States. He was the founder of the Siberian University, and a promoter of universal education. Among his works are: *The Russian Commune in Prison and in Exile; Siberia as a Colony; The Culture and Industrial State of Siberia,* etc.

YAGER, n. *yâ'gėr* [Ger. *jäger,* a hunter]: in *Prussia,* a rifleman; in *Austria,* a mountaineer belonging to a body of light infantry; a hunter.

YAHOO, n. *yâ-hô'* [a name used by Swift in *Gulliver's Travels*]: a savage or one like a savage; one of a race of brutes having the form of men.

YÂJNAVALKYA: reputed author of the S'atapatha-Brâhman'a (see VEDA—*Yajurveda*), and of a *Dharmas'-âstra*, or law-book (see SANSKRIT LITERATURE—*Law*) His name points to his descent from Yajnavalka; and tradition makes him a descendant also of *Vis'wâmitra* (q.v.), belonging to a branch of the *Kus'ikas*. He seems to have had high position at the court of King Janaka of Videha, but nothing is known regarding the age in which he lived.

YAJURVEDA, n. *yâj'ėr-vē-da* [Skr. *yaj*, to sacrifice]: in *Hind. sacred literature*, the third portion of the Veda, generally called the third Veda. It consists not merely of verses from the Rigveda, but also of prose sentences used at the offering of certain sacrifices. There are two editions, called the Black and the White Yajur. See VEDA.

YAK: the native name for the wild ox (*Bos grunniens*) of the mountainous regions of Tibet. There are two races: the wild yak, generally black, which is found near the snow line, descending into the valleys in winter, and a domesticated race of various colors, black and white being most common. The yak is about the size of the common ox, to which it has a general resemblance, but it is covered with a thick coat of long, silky hair, hanging down like the fleece of a sheep, completely investing the tail, and forming a lengthy fringe along the shoulders, flanks, and thighs. This fringe, which exists in both races, was apparently developed as a protection to the animal in its alpine haunts, as the long hair forms a sort of mat which defends the body from the effects of the cold when the animal is reposing in the snow.

The domesticated race is of great importance to the natives of Tibet. The yak is employed as a beast of burden, but never for tillage or draught; the milk is very rich, and yields excellent butter; the flesh is of the finest quality, and that of the calves is far superior to ordinary veal. The hair is spun into ropes, and made into coverings for tents, and the soft fur of the hump and withers is woven into a fine strong cloth. The tails, often dyed red, are made into the chowries or fly-flappers, used in India. Yaks are often seen in zoological gardens and menageries, and have repeatedly bred in Europe; and it is probable that they might be advantageously introduced into the northern parts of the continents of America and Europe.

YAKIMA: a river in the state of Washington, rising in the Cascade Mts., and after a s.e. course of about 175 m., flowing into the Columbia about 6 m. n. of Paseo and Kennewick, and 10 m. above the confluence of the Snake river. It flows through an important coal-mining

region, and its valley and those of its numerous short tributaries are among the most fertile in the state. The Northern Pacific railway traverses the whole length of the valley of the Yakima, almost to its source.

YAKIMA, or STAMPEDE PASS: a defile over the Cascade Mts., in the state of Washington, near the source of the Yakima river (q.v.). Its highest point is 3,600 ft. It is crossed by the Northern Pacific railway, which at an elevation of 2,800 ft., between Martin and Stampede, passes through the Stampede Tunnel, 9,850 ft. long.

YAKOBA, or YAKUBU, West Africa: a town in n. Nigeria, finely situated on a plateau partly surrounded by mountains, 140 m. s.e. of Kano. It is walled, and the interior is finely diversified with gardens and ponds. The climate is healthful. Pop. 50,000.

YAKONAN [from *yakwina,* 'spirit']: a linguistic stock of N. American Indians, consisting of the Alsea, Yakwina, Kuich, and Siuslaw divisions. The home of the Yakwina was along Yaquina river, Oregon, from the site of Elk City to the sea; they were formerly numerous, occupying 56 villages in early days, but the tribal distinction of the Yakwina, as well as of the other Yakonan divisions, was gradually broken down through extensive intermarriage; there are only a few Yakwina left and these reside on Siletz reservation, but their number is unknown. The Alsea formerly dwelt in villages along both sides of Alsea river, Oregon, and on the adjacent coast; they are now on Siletz reservation, and perhaps a few are on Grande Ronde reservation. The Siuslaw were also village dwellers, inhabiting Siuslaw river as late as 1857; they are probably extinct. The Kuich, or Lower Umpqua, villages were on both sides of Umpqua river from its mouth upward for 30 m.; a few survivors still reside on Siletz reservation. The entire population of the Yakonan Indians probably does not exceed 400.

YAKSHA, *yăk'shă:* in later Hindu mythology, one of a class of demigods who especially attend on Kuvera, the god of riches, and are employed in the care of his garden and treasures. According to the Vishn'u-Purân'a, they were produced by the god Brahman, as beings emaciate with hunger, of hideous aspect, and with long beards; but Brahmanic poetry generally represents them as inoffensive. Buddhists on the contrary, describe them in some of their legends as cruel demons, who feast on serpents and human corpses, and when filled with this loathsome food, indulge in fierce combats; but in other legends, as beings who delight also in dances, songs, and amusements, and sometimes even enter the paths that lead to *Nirvân'a.* In Buddhist legends they have also the power of raising storms, and are far more prominent than in the Brahmanic pantheon. The Yak-

shas of the Brahmanic mythology have wives, Yakshîs, who sometimes appear in the train of Umâ (q.v.).

YAKUB BEG, surnamed ATTALIK GHAZI ('leader of the champions of the faith'): amir of Kashgar: b. Russian Turkestan early in the 19th c.; d. 1877, May 31. He distinguished himself in the defense of Khokan against the Russians. But he first rose to great eminence after the recovery of Kashgar from the Chinese in 1864, when he acted as lieut. to Buzurg Khan, whom he soon supplanted. For 12 years this remarkable man conferred on a large part of Central Asia the benefit of a settled though rigorous government. He drilled and disciplined a large civil staff, while his army contained the best native soldiers in Central Asia. In his foreign policy he was strongly anti-Russian, and ultimately friendly to Great Britain. China, however, set out to recover its lost Mohammedan provinces, and had gained some victories when Yakub died—by assassination, some said. His realm at once fell in pieces. The Chinese armies overran the country (1878), and Kashgar again came under Chinese rule.

YAKUB KHAN: amir of Afghanistan: b. 1849. Appointed governor of Herat, he became extremely popular, but in 1870 broke into open revolt, and in 1874 was imprisoned at Kabul. On the death of Shere Ali he was proclaimed amir (1879) and concluded a treaty of peace with the British at Gandamak.

YAKUTSK'. See JAKUTSK.

YALE, *yāl,* ELIHU: 1649, Apr. 5—1721, July 8; b. in or near Boston. His father, who had come to New Haven 1638, returned to England while his son was a child, and Yale never afterward visited America. About 1678 he went to the E. Indies, and was governor of Fort St. George, Madras, 1687-92. He acquired wealth, returned to England, made the first auction known there, became governor of the East India Company, and was made a fellow of the Royal Society. Between 1714 and 1721 he gave to the Collegiate School of Connecticut books and money valued at £500; and when its new building was opened at New Haven 1718, the trustees named it Yale College, and by the charter of 1745 this name was formally given to the institution. Yale was buried at Wrexham, Wales.

YALE, LINUS: inventor: 1821, Apr. 4—1868, Dec. 24; b. Salisbury, N. Y. For a time he was a portrait-painter. In 1850 he devised a key for bankers' safes, and thenceforward gave his time to mechanical inventions; and his investigations led to the adoption of the dial and shaft of combination locks, the perfecting of the clock lock mechanism, and the invention of the double lock. He patented devices for adjusting the joiners' square at a right angle, for reversing the motion of screw-taps, and for improvements in mechanics' vises, and introduced

valuable improvements in post-office locks and boxes. He received first awards for his exhibits at world's fairs in this and in other countries. He died in New York.

YALE UNIVERSITY: at New Haven, Conn.; third in origin (1701) as a col. in Amer., after Harvard (1638) and William and Mary (Va.) (1694). Yale has a special art school, the Street Art School, building which cost $220,000, and $75,000 endowment. One wing of a projected museum has been built, at a cost of $175,000. The zoological and mineralogical collections are notable. Yale has had the Sloane Physical Laboratory since 1882-3; the Kent Chemical since 1887, costing $75,000; and has at the Sheffield Scientific School important facilities, provided from the Fayerweather bequest 1891.

The institution was founded at Saybrook, Conn., as 'a collegiate school,' 1701, Sep.—Nov., by the Rev. James Pierrepont (q.v.), minister of New Haven, the Rev. Abraham Pierson (1641-1707—q.v.), of Killingworth, and eight other Congl. ministers in Conn., to secure 'a learned and orthodox ministry,' by instruction in 'arts and sciences' suited to fit for 'employment both in church and state.' The institution had a struggling existence at Saybrook until 1716; when removal to New Haven was undertaken, and a college building was provided on the s.e. corner (1¼ acres) of the present campus—a structure of wood, 170x22 ft., with three stories, 22 sets of rooms, a large dining-hall, used also as a chapel, and a library. This ancient college, completed and opened 1718, Oct. 8, was in use until the winter of 1775-6, and its dining-hall and kitchen until 1782. Toward the cost of this first college the Rev. Cotton Mather secured a cargo of gifts from Elihu Yale (q.v.) of London, on a suggestion that 'what is forming at New Haven might wear the name of Yale College.' The donor, who had become very rich as gov. in Madras, India, was of Boston birth; and his father, David Yale, had been a colonist at New Haven, and step-son of Gov. Eaton. A second gift from Gov. Yale met part of the cost (one-fifth) of the second building, a house for the rector in College st., a little s. of the campus.

The first rector, 1701, Nov.—1707, Mar. 5, was the Rev. Abraham Pierson (1641-1707—q.v.), who stood next to Pierrepont and Yale among the founders. The Rev. Samuel Andrew, minister of Milford, was the second rector, 1707-18, but the work of teaching was left to one or two tutors, until the Rev. Timothy Cutler, D.D. (q.v.), was given active charge as third rector, 1719, Mar.—1722, Sep.; and on his declaring for the divine right of episcopacy, his discharge from further service was followed by the election as fourth rector, 1726-39, of the Rev. Elisha Williams (q.v.), under whom, 1737, originated the plan of a committee, the 'prudential committee' of nearly a hundred years past, serving as the work-

ing body of the corporation. The notable gifts of the celebrated Bishop Berkeley date from 1731-33, about 900 vols. of books and an estate near Newport, unfortunately leased in 1763 for 999 years at $55 a year.

The fifth rector, 1739, Oct.—1766, Sep., was the Rev. Thomas Clap, under whom a new charter was secured, 1745, which designated the corporation as 'The President and Fellows of Yale College in New Haven,' and provided for organization, powers, and administration as in 'colleges or universities,' with a view to 'the promoting all good literature in the present and succeeding generations.' A proficient in mathematics and natural philosophy, ardently opposed to 'new light' revival movements, and wisely zealous for the independence of the college, Pres. Clap did much to broaden the course of study, to secure increased state or colony aid, to have regular professors, not merely tutors, and to multiply buildings. The colony grant 1745-55 was 'one hundred pounds silver money, at the rate of 6*s.* 8*d.* per ounce.'

The first brick college, old 'South Middle,' was built 1750-52, at a cost of £1,660 sterling, mostly colony funds. The first professorship, that of divinity, was provided for 1746, and filled 1755, the college having meanwhile separated from the First Church in New Haven, under an alarm of heresy there, as well as because of dull preaching. A college church was organized 1757; a divinity professor's house was built 1757-8, in York st., now the Medical College site; a brick chapel and library building (later the Athenæum) was undertaken 1761, and stringent measures adopted to bind the college to orthodoxy. Public criticism and alienation of colony support from 1755, with an effort, 1763, to have the legislature take in hand the affairs of the college, also some disorder among the students, had seriously crippled the institution, when the divinity prof. Naphtali Daggett, D.D. (q.v.), was put in charge, 1766, Oct.—1777, Mar., as president *pro tem.* The depression of this period was modified by the work of such able tutors as Joseph Howe, John Trumbull, Timothy Dwight (later president), and Joseph Buckminster, whose zeal for learning and fresh thought made a beginning of liberal development. Other notes of progress were the founding of a second professorship (mathematics and natural philosophy); the class-listing of students alphabetically instead of, as before, according to supposed family standing; and a new literary society 1768, more democratic (Brothers in Unity) than the earlier Linonia 1753.

The next president, Ezra Stiles, D.D., LL.D. (q.v.), 1777-95, was an ardent scholar, more than 20 years a pastor at Newport, R. I., notably free from orthodox rigidity, fervently patriotic through the revolution, and most devoted to the college, which he found practically broken up by the outbreak of the revolution. The roll showed in 1777 132 students, in 1787 139. The labors of Dr. Stiles embraced mental and moral philosophy, church

history, mathematics and natural philosophy, and divinity. A professorship of Hebrew and other oriental languages was provided for 1781. A new brick building, 1782, provided a common dining-hall and kitchen, until taken later, 1820, for a chemical laboratory. Under a plan of James Hillhouse LL.D (q.v.), college treasurer (to 1832), the gov., lieut.-gov., and six senior state senators became members of the corporation, from 1792, June, to secure a grant from the state and satisfy the anti-clerical demand for state oversight. A new dormitory, South College, 1793-4, was one of the results. A departure effected by Dr. Stiles was the discarding of the elaborate theological tests exacted by the corporation of ministers at his accession, and the requiring only a simple general assent to the 'Saybrook Platform.' This broader tendency was notably represented in the next pres., 1795-1817, Jan., the Rev. Timothy Dwight, D.D., LL.D. (1752-1817), an educator and preacher among the best in New England history, of most impressive personality, a stimulating teacher, and of remarkable oratorical power. The college thus far had been ruled by the pres. as autocrat; and upper-class tyranny over lower, borrowed from English university custom, was in vogue. Dr. Dwight created government by the faculty—pres., profs., and tutors in council. From 1804 he secured class equality, and made all college relations those of courtesy and social freedom. He added the duties of divinity prof. and college preacher to those of pres., and was one of the most effective and influential religious teachers in American history. A department of rhetoric and English literature dates from his work. In 1801 he brought Jeremiah Day into the chair of mathematics; secured a new chair of chemistry, mineralogy, and geology 1802, with Benjamin Silliman (1779-1864) as incumbent; and another chair of ancient languages, Hebrew, Greek and Latin, and church history, which James L. Kingsley filled from 1805. A professorship of law, also, was instituted 1801, prophetic of the Law School more expressly aimed at from 1824, and instituted 1843. From 1806 university lines began to appear in first steps toward founding a medical department, which the state authorized 1810, and full work in which began 1813, with Nathan Smith, Eli Ives (q.v.), and Jonathan Knight as professors, and a building at the head of College st., bought 1814 with a state grant of $20,000. Dr. Dwight's anticipations were also of departments of theology and of law, with Nathaniel W. Taylor, D.D. as Yale's theologian—a hope fulfilled 1822. Students from all parts of the country began now to give Yale a national character. Pres. Dwight's foresight had secured the present college square 1796, and new buildings were erected—North Middle College as a dormitory; the Lyceum for chemical laboratory, library, and recitation-rooms, 1801-03, and a new president's

house at the n.e. corner of the campus. Pres. Dwight was the parent of the modern Yale—the Yale of Silliman, Kingsley, and Taylor; of Day, Woolsey, Porter, and the second Dwight—and of the Yale University of today. He was one of the strong and broad men in American history. Even as the founder about 1785 of an academy, which soon gained national reputation, he was the pioneer of equal education for women, his custom, strenuously advocated, having been to assign to girls the same courses of study as to boys.

It was as Pres. Dwight's lieut. that Prof. Jeremiah Day, D.D., LL.D. (q.v.), an unobtrusive scholar, but versed in the new system of faculty government and university development, became pres. 1817-46; and carried on Dr. Dwight's work, with such masters of instruction under him as Dr. Dwight's spirit had called forth, or was later to call forth—Silliman, Kingsley, Woolsey, Thacher, Goodrich, Stanley, Olmstead, Taylor, and Fitch. Eleazar T. Fitch, D.D. (q.v.), became divinity prof., and was college preacher and pastor (until 1852); Chauncey A. Goodrich, D.D. (q.v.), filled a new chair of rhetoric (until 1839); Kingsley's chair became in 1831 that of Latin only, while Theodore D. Woolsey took a new chair of Greek; Thomas A. Thacher became asst. prof. of Latin 1842, succeeded Kingsley 1852, and served to 1886, Apr.; Denison Olmsted, LL.D., took the chair 1825 which was divided 1836 into nat. philosophy and astronomy (retained by him), and mathematics, a new chair to which Anthony D. Stanley was appointed. Dr. C. A. Goodrich, on taking later, 1839, a Divinity School chair of the pastoral charge, was succeeded as prof. of rhetoric by the Rev. William A. Larned (until 1862), but without losing his place as a most impressive speaker to the students on religious themes, and conductor of religious exercises.

From 1826-30 such studies as English grammar, geography, and arithmetic gave place to modern languages, political economy, and law. From 1830 the system of having a division of each class instructed in Greek, Latin, and mathematics by the same tutor was changed, at the instance of Horace Bushnell, later known as one of the most brilliant of preachers, to that of assigning each tutor one subject for all the divisions of a class. The question of abandoning the required study of Greek and Latin was so far agitated 1828 as to be made the subject of an exhaustive report to the corporation by the faculty, with the result so much against the new proposal as to lead to putting Stanley on Latin only, and Woolsey, in a new chair, on Greek only, with Thacher also for Latin, 1842-46, and James Hadley, LL.D. (q.v.), for Greek, 1848-72—under whom freshman Greek became the most fruitful discipline of the four years' course. Theology became a distinct dept. from 1822, with Nathaniel W. Taylor in a chair of

didactic theology (until 1858), from which proceeded, during a third of a century, the chief influence tending to 'new school' modification of Calvinistic divinity, the advance of which modification has, in another third of a century, gone far beyond the limits which Dr. Taylor thought final. The academical professors, Kingsley, Fitch, and Goodrich, lent help in the Divinity School, supplementary to the marvellously vigorous and inspiring work of Dr. Taylor. Josiah W. Gibbs became lecturer on sacred literature 1824, and full prof. 1826. A Divinity School dormitory was erected 1835-6, as the n. end of the row of college buildings, which had been extended by North College 1820-1, and a new chapel 1823-4, separating North and North Middle. An upper story of the chapel contained rooms for students, and over these an attic housed the college library (until 1843), and later a part of the early work of the Scientific School. A central building on the campus, 1818-9, provided a new and large dining-hall, with basement as kitchen, and with an upper floor occupied by Prof. Silliman's cabinet of mineralogical specimens, while the old dining-hall became his chemical laboratory. In 1842 the system of a common dining-hall was abandoned, and the rooms were given to nat. philosophy. After 50 years a return to the system of commons for students was decided on for 1892-3. The Trumbull Gallery, a small structure, used for offices for the pres. and treas., was erected 1831-2; a considerable library building was begun 1842, and completed 1846 at a cost of $34,000.

State aid for the college had become after 1831 (when $7,000 was given for Trumbull Gallery) so uncertain as to occasion an organized attempt to enlist the alumni in systematic effort to secure funds, and $100,000 was raised 1831-36. In 1824 steps were taken toward the creation of a law school—outside students being enrolled, and, from 1826, their teacher, Judge David Daggett, serving as law prof. to the college. In 1843 degrees in law began to be given. The earliest plans for graduate study date from 1841, when Edward E. Salisbury, LL.D. (q.v.), was appointed prof. of Arabic and Sanskrit. Within the range of Yale, under President Day, Amherst College was founded 1821, Trinity at Hartford 1823, and Wesleyan at Middletown 1832. The annual average of graduates, which had been about 56 under Dwight, was about 90 under Day.

The more recent period of Yale University covers the presidencies of Theodore Dwight Woolsey, D.D., LL.D., 1846-71; Noah Porter, D.D., LL.D. 1871-86; Timothy Dwight, D.D., LL.D. (b. 1828), 1886-99; and Arthur T. Hadley, LL.D., since 1899. Dr. Woolsey after he became pres., an ordained minister, instructed for 25 years in history, political science, and international law. His unique intellectual and moral force constitutes one of the historic treasures of Yale. Dr. Porter took 1847 a

new chair, moral philosophy and metaphysics, and continued until his death, 1892, one of the most eminent living authorities in that dept. of study. The second Pres. Dwight, grandson of the first, was the Divinity School prof. of sacred literature from 1858, and especially represents that dept. of the university, which from 1866 has had rapid development, and now has two large Divinity Halls, a chapel, and a library building.

Women are admitted to the School of Fine Arts, the Department of Music, and the PH.D. courses of the Graduate School, and public school teachers are admitted to some of the regular courses. Numerous scholarships and fellowships are provided in the Academic Department, the Scientific School, the Divinity School, and the Graduate School. A 'Bureau of Self Help' is maintained, through which students are aided in obtaining employment. The university maintains a public lecture course, and provides several series of lectures in the different departments; prominent among the latter are the Lyman Beecher lectures on preaching, the Silliman Memorial lectures, the Dodge lectures on the responsibility of citizenship, and the Bromley lectures on journalism, literature and public affairs. The University Libraries in 1908 contained 550,000 volumes, exclusive of pamphlets. In addition there are several special libraries, including the Linonian and Brothers Library, the Dwight Hall Library, the Law Library, the Scientific School Library, the Trowbridge Reference Library of the Divinity School, the Lowell Mason Library of Church Music, the Library of Foreign Missions and several department and club libraries. The Peabody Museum was established in 1866 by a gift of George Peabody (q.v.) and contains excellent collections in mineralogy, geology and paleontology, and zoology.

Of the buildings of the univ., Dwight Hall, Alumni Hall, Durfee Hall, Battell Chapel, Farnam Hall, Lawrence Hall, Phelps Hall, Welch Hall, Osborn Hall, Vanderbilt Hall, Art School, the Library, and South Middle College, are grouped about the college campus, which is rectangular in shape. In another group to the north are the bicentennial buildings, built largely by the alumni at the time of the anniversary; these are Woodbridge Hall, Woolsey Hall, Memorial Hall, and University Hall. The gymnasium is situated to the n.w. of the college campus, near the Peabody Museum. Herrick Hall, White Hall, and Pierson Hall. The Scientific School occupies seven buildings, lying n.e. of the bicentennial buildings. The Divinity School lies to the south of this group. Hendrie Hall (the Law School) lies east of the main campus, facing the Green. The Medical Hall and the Medical School Laboratory lie to the west of the campus; the University Clinic Building is opposite the New Haven Hospital; the Forest School occupies Marsh Hall, the house of the late Professor Marsh, in the Botanical Gardens. The athletic field of 30 acres is situated about

a mile from the campus. The students maintain a Christian Association, an Athletic Association, numerous literary, dramatic, and technical societies, and social, and special literary and technical clubs. A chapter of Phi Beta Kappa is also located at Yale. Yale has long taken a prominent part in intercollegiate athletics, and general physical training is given full attention.

Yale ranks as one of the leading American universities, in number of students, standards of scholarship and in the influence exercised through her graduates on national life.

YALU, *yā'lô,* Korea: a river forming the boundary with Manchuria. In its upper reaches it is known as the Am-nok or Ap-nok. Its source is in the Paik-tu-san, the highest peak (8,000 feet) of the Shan-a-lin Mts. of Manchuria. It flows into Korea Bay, near Wi-ju, after a s.w. course of about 300 m., and has numerous tributaries, chief of which is the Chang-jin river. It is navigable for sea-going vessels 30 m. from its mouth, and by smaller vessels 145 m. to Wi-wen.

YALU RIVER, Battle of the: chief naval battle of the Japan-Chinese war and of recent years; fought 1894, Sep. 17, near the mouth of Yalu river, n.w. of Korea. This battle, which ended in a brilliant victory for the Japanese, supplied the first test of the recent style of warships under fire. Eleven Japanese men-of-war, under Admiral Ito, engaged a Chinese fleet of 12 ironclads and cruisers, and after five hours' fighting sank 4 Chinese vessels, and burnt 3 others. The loss of life among the Chinese, who were officered by Americans and Englishmen, was more than 600 men, while that of the Japanese was 67 killed and 197 wounded. Only 3 Japanese vessels were seriously damaged in the battle, and but one of these was obliged to lay up for repairs. The superiority in speed of the Japanese war-ships enabled them to prevent fighting at close quarters and thus they avoided the fire of the heavy guns of the Chinese ships.

YAM: a popular name for various species of the genus *Dioscorea* of the order *Dioscoreaceæ,* and loosely applied to certain varieties of the sweet potato. The true yams belong to a genus consisting of more than 150 species widely distributed throughout the tropics. They have herbaceous, twining or creeping stems; broad, alternate or opposite, usually simple leaves; and small diœcious flowers, followed by three-winged capsular fruits containing winged seeds. The fleshy roots of some species are widely eaten in the tropics. One of the best known species is *D. alata,* a native of India and the South Sea Islands, but distributed throughout the tropics. Its tubers usually attain a length of 3 ft. and a weight of 30 lbs., but specimens 3 times as large are not uncommon. They are black or brownish externally and pink within, and are rich in starch. When boiled their acridity is dispelled and they become of pleasant

flavor. It is claimed that this species is the parent of most of the edible so-called species such as *D. sativa, D. aculeta, D. rubella, D. globosa,* etc. The air-potato (*D. bulbifera*) is an Asiatic species cultivated to a small extent in the s. United States, and in conservatories, for its odd, angled tubers, which are borne in the axils of the leaves. They often exceed 2 lbs. in weight and are sometimes eaten like potatoes. The Chinese yam, Chinese potato, or cinnamon vine (*D. divaricata*), is a native of the Philippine Islands, whence it has been introduced into the gardens of temperate as well as tropical climates for ornament. It bears cinnamon-scented white blossoms, aerial tubers which are used for propagation. As far n. as New York the plants have proved hardy.

YAMA: a Hindu god, the judge of the dead, whose good and bad actions are read to him out of a record, and who according to their merits and demerits are sent to the celestial or to the infernal regions. Hindus offer to him daily oblations of water.

YAMADOU, n. *yăm'a-dô* [Guianan name]: in *bot.,* an oil expressed from the seeds of *Myristica sebifera,* a tree about 10 ft. high growing in Guiana.

YAMAGATA, Japan: a town in the island of Hondo, capital of a prefecture, 200 m. n. of Tokyo. Pop. (1899) 35,300.

YAMAGATA, Aritomo, *yâ'mă-gă'tâ â'rĭ-tō'mō,* Marquis: Japanese general and Elder Statesman, b. Choshiu, 1838, of a samurai or warrior family. He came into prominence in 1868 in the movement to suppress the shogunate and restore the imperial power; visited Russia and France in 1869 to study their military establishments; and from a position in the ministry of war rose to be War Minister in 1873. He suppressed the Satsuma rebellion, headed by Saigo, in 1877, and was appointed commander of the Imperial Guard and chief of the general staff. He became minister of the interior in 1885, and Premier in 1889. He was appointed minister of justice in 1891. At the outbreak of the Chino-Japanese war (1894-5), he was given command of the 1st army corps, and inaugurated the expedition by the brilliant victory of Ping-yang. Ill-health compelled him to resign during his victorious march on Mukden. He was created marquis and marshal of the empire and in 1896 represented the Mikado at the coronation of Czar Nicholas II. He was one of the four Elder Statesmen whose ripened experience contributed to the successful campaign against Russia in 1904-05, and whose wise counsels facilitated the conclusion of peace.

YAMAGUCHI, Japan: city, capital and chief city of the prefecture of Yamaguchi, in the s.w. part of the island of Hondo; 15 m. back from the coast. It was formerly the residence of the lords of Choshû, a Mori family, and became the seat of the local government in

1860. In 1550 a church was established here by Francis Xavier, but was finally destroyed. Pop. 45,000.

YAMAJI, MOTOHARU, VISCOUNT: Japanese soldier: b. Tosa province, island of Shikoku, about 1840. He won distinction in the campaign against the unsuccessful revolt in Satsuma province (island of Kiu-siu) in 1877; and was promoted lieut.-gen. In the Chinese-Japanese war of 1894-5 he had the immediate direction of the attack on Port Arthur, which was finally taken, 1894, Nov. 22. This won for him a great reputation in Japan, where, in allusion to his loss of an eye, he is known as the 'One-Eyed Dragon.'

YAM-A-MAI: an oriental kind of silkworm which feeds on the oak, and produces a silk with peculiar, but useful qualities, extensively utilized in Japan and somewhat elsewhere. See SILKWORM.

YAMASKA, Quebec, Canada: (1) a village and railway junction of Yamaska co., on the Yamaska river, 31 m. n. of Saint Hyacinthe. The river affords power for several mills. Pop. (1901) 762. (2) A county bordering on Lake Saint Peter; area, 183,705 acres. Capital, Saint François du Lac. It is drained by the Yamaska, Nicolet, and Saint Francis rivers. Pop. (1901) 16,204. (3) A river flowing from Brome Lake, Brome co., and after a course of about 100 m. through a fertile country, draining into the Saint Lawrence river at Lake Saint Peter.

YAMBO, YAMBU, or YEMBO-EL-BAHR, Arabia: a seaport town on the Red Sea, in the province of Hedjas, 131 m. e. of Medina, of which it is the harbor. Marking the end of the third quarter of the caravan journey from Cairo to Mecca, the town bears the title 'Gate of the Holy City.' The town consists of a long row of white houses built of limestone and coralline, standing on the edge of an arid plain. It has considerable imports and transit trade between Suez, Jidda, and Medina. Pop. est. 7,000.

YAMMER, v. *yăm'mėr* [imitative: Ger. *jammern*, to lament, wail]: in *Scot.*, to cry out piteously; to whine.

YAMUN, or YAMÊN, n. *yâ'mŭn* [Chinese, 'flag gate']: the suite of buildings which serve as the official and private residence, and place of business, of a Chinese mandarin who holds a seal; a government office, or bureau where the business of a particular region or department is transacted. The *Tsûng-li Yamŭn* (*tsông-lē yâ-mŭn*), or 'general managing bureau,' is the dept. of the Chinese govt. at Peking which attends to foreign affairs and forms the channel of communication between the foreign ministers and the throne. It was established shortly after the capture of Peking by the British and French 1860, and consists of 11 members, who consult together under the presidency of one of the princes.

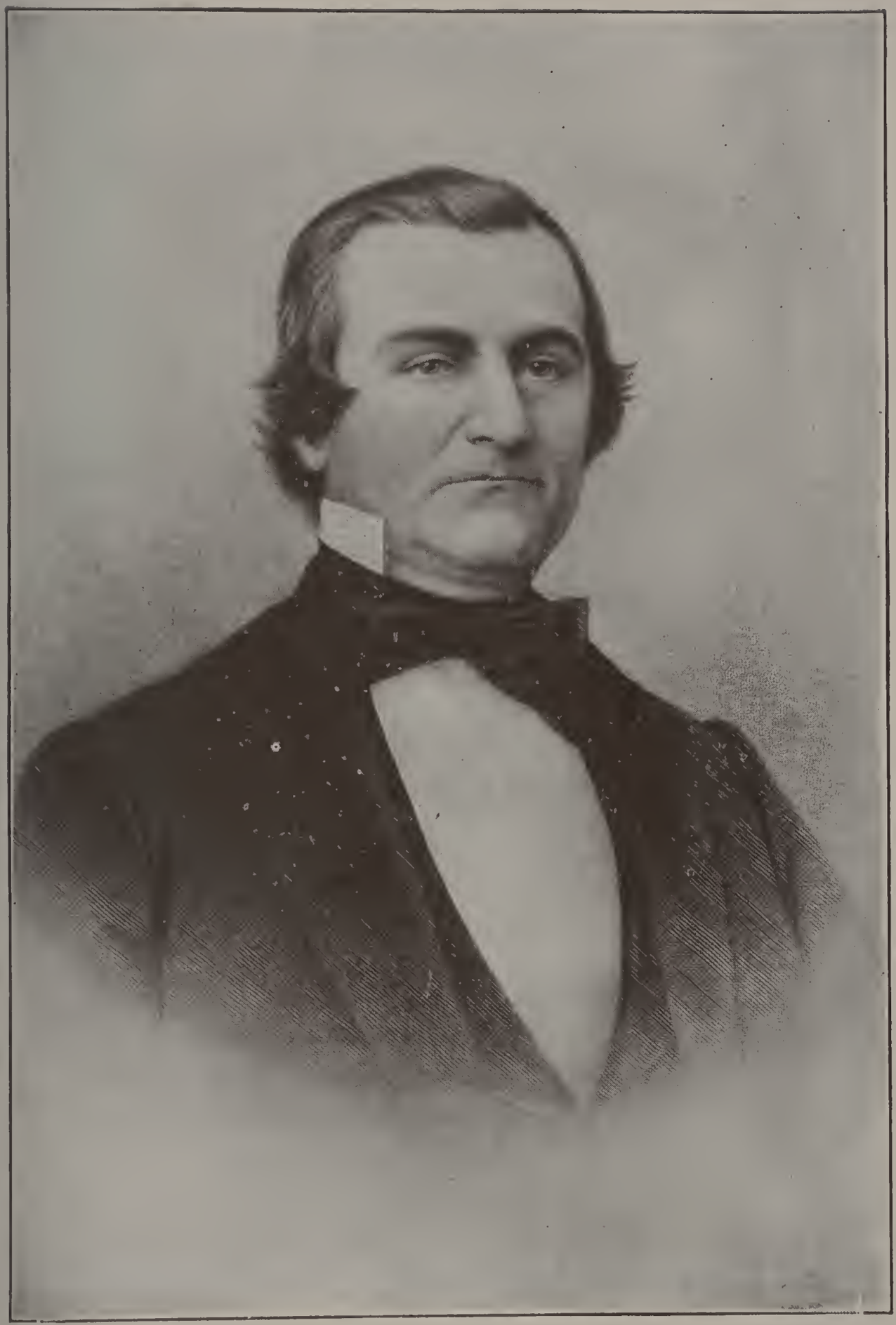
YAMUNÂ, *yâ-mô'nâ*, the modern JUMNA: one of the

sacred rivers of the Hindus, and mentioned as such in the hymns of the *R'igveda.* Bathing in it, especially where it falls into the Ganges, at Allahabad, was at a later period, and is now supposed to have the efficacy of removing sin, because at Allahabad the god Brahman is said to have performed a great horse-sacrifice—whence this place is termed *Prayâga*, literally, 'sacrifice,' or *Bhat't'a-prayâga,* literally, 'the best sacrifice.' (Though Allahabad, which is a celebrated place of pilgrimage, is *the* Prayâga, this term is applied also to other places where two sacred rivers meet; of which places four, at the confluence of the Ganges with the Alakanandâ, Pindar, Mandâkini, and Bhâgîrathî, are, besides Allahabad, held in especial sanctity, and severally called *Nanda, Karn'a-, Rudra-,* and *Deva-Prayâga*). In the Purân'ic mythology the Yamuna—in Sanskrit, a word in the feminine gender—is called a sister of the god *Yama* (q.v.); and a legend is told in regard to her, according to which Balarâma, brother of Kr'ishn'a (see VISHN'U—the 8th Avatâra), once ordered the river to come to him, and, as she disobeyed his bidding, plunged his plowshare into her banks, and dragged her to him. Yamuna, the legend continues, was thus compelled to quit her ordinary course, and to follow Balarâma whithersoever he went. At last, however, appeased by her entreaties, he let her go, after she had watered all the country. Prof. Wilson, in his translation of the *Vishn'u-Purân'a*, appends to this legend the following remark: 'The legend probably alludes to the construction of canals from the Jumna, for the purposes of irrigation; and the works of the Mohammedans in this way, which are well known, were no doubt preceded by similar canals dug by order of Hindu princes.'—*Vishn'u-Purân'a* (Lond. 1840, p. 572).

YANA ('people'): a small tribe, forming the Yanan linguistic stock of North American Indians, whose former habitat was bounded on the e. by a mountain range a little w. of Lassen Butte, and terminating near Pit river, in n. California; on the n. by a line running n.e. to s.w., passing near the n. side of Round Mtn., 3 m. from Pit river; on the w. by a line extending from Redding s. on an average 10 m. to the e. from Sacramento river; n. of Redding it approximates twice that distance. The tribe and stock were represented in 1884 by 35 individuals divided into two groups—one at Redding, the other in their original conntry at Round Mtn. They have tradition to the effect that they came from the East, and it is said that in physical traits they differ markedly from all the n. California Indians.

YANA, or JANA, Eastern Siberia: a river which rises in the Verkhoyanskii Mountains, and after a n. course of about 750 m. enters the Arctic Ocean, near Ustjansk, by seven large and many small mouths.

YANCEY, *yăn'sĭ,* WILLIAM LOWNDES: politician 1814,



W. L. YANCEY.

Aug. 10—1863, July 28; b. Ogeechee Shoals, Ga. He was educated at Williams College; was admitted to the bar at Abbeville, S. C.; removed to Ala. 1837; edited the *Cahawba Democrat* and the *Wetumpka Argus;* served in the Ala. legislature, and in congress 1844-47; and was a member of the national democratic convention 1848. He vigorously opposed the compromise measures of 1850, became a leader of the extreme pro-slavery party, and worked indefatigably to 'fire the southern heart' and bring about secession. In 1860, Apr., he withdrew with other extremists from the democratic convention at Charleston; canvassed the north and west in the presidential campaign 1860; reported the ordinance of secession at the Ala. convention, Montgomery, 1861, Jan. 7; and in Feb. was appointed a commissioner to secure the recognition of the Confederate states by the European powers. After his return 1862 he served in the Confederate senate till his death, near Montgomery.

YANG AND YIN: in Chinese philosophy, terms employed to indicate the two phases under which the supreme principle of the universe, *Tai-ki,* displays itself in the world of phenomena, Yang and Yin being, in various proportions, blended in all forms of existence.

YANG-CHOW-FU, *yâng-chow-fô:* city of China, cap. of the dept. of Yang-Chow-Fu, prov. of Kiang-sû; on the Yun-liang-ho or Grand canal (n. of the Yang-tse); lat. 32° 21′ n., long. 119° 15′ e. Like all Chinese cities, it is surrounded with a crenelated wall 3 to 4 m. in extent, and has extensive suburbs. Many of the streets are well built and lined with handsome shops and warehouses. It is an important trading centre, is noted for its candy and sweetmeats, and is the chief seat of the salt manufacture in the eastern provinces. It suffered much during the Tae-ping rebellion, but recovered rapidly. It again received a severe blow when the govt. 'tribute-rice' transport from the s. provinces was diverted from the canal-route to the sea-route to Tien-Tsin. By appointment of Kublai-Khan, Marco Polo ruled over Yang-Chow-Fu for three years (about 1282-85). He describes Yang-Chow-Fu as 'a great and noble city with 27 other wealthy cities under its administration, . . . whose people are idolaters, use paper-money, [and therefore] are subjects of the great khan.'—Pop. estimated 360,000.

YANG-TSE-KIANG: the name generally given to one of the greatest rivers of China throughout its entire course, although this name is only applied in China to the lower course of the river, the entire river being called simply Kiang, or Ta Kiang (river or great river), while in the various provinces it traverses it is generally known by special names. It rises in the Tangla Mountains in mid-Tibet, about lat. 35° n. and long. 89° e., and is first known by the name of Muru-Ussu. In its upper course it is sometimes called the Kin-cha-kiang.

Its upper course through the mountainous region of Tibet extends to about 1,100 miles, during which its windings and falls present numerous striking scenes of natural beauty. It crosses the Chinese frontier in the province of Yunnan. Between the town of Li-kiang in this province, and Hui-li in Sze-chuen, for a course of about 250 m., it flows in an e. direction through a winding channel or mountain gorge of imposing grandeur. Traversing the whole province of Sze-chuen in a n.e. direction, and passing in s.e. direction into the province of Hu-peh, it reaches at Kingchau the great Chinese plain, and traversing the provinces of Ngan-hui and Kiang-su, and passing the cities of Han-Yang, Han-kau, and Wu-chang, a great seat of the tea exporting trade, Ngan-king, Nanking, and Chin-kiang, it enters the Tung-hai, or Eastern Sea, above Shanghai. Its direct course from its source to its mouth is estimated at 1,800 m.; its course with windings is about or considerably over 3,000. It receives numerous affluents, and is crossed by the Grand Canal, which forms a junction between it and the Hoang-ho. The river and the ports of Chin-kiang and Han-kau were opened to foreign navigation in 1860, I-chang (1,000 m. up), and others since. A British squadron sailed up the river in 1861 for more than 800 m. The navigation above the confluence of the Tung-ting is interrupted by rapids. The tidal influence reaches in February to Lake Po-yang, 436 m. from the sea. Consult Little, *Through the Yang-tse Gorges* (1898).

YA'NINA. See JANINA.

YANK, n. *yăngk:* a jerk; a twitch; a quick sharp stroke or blow: V. to twitch or jerk powerfully; to snatch away unexpectedly.

YANK, n. *yăngk:* slang for YANKEE.

YANKEE, n. *yăng'kē* [supposed American Indian corruption of the F. *Anglais,* English, or of the word *English, yaunghees, yenkees,* or *yenghees* being the name given by the Massachusetts Indians to the English colonists: comp., however, Scot., *yankie,* a sharp, clever, forward woman; *yanking,* active, pushing: connected with Icel. *jaga,* to move about]: a citizen of New England, or of the northern United States of America; in general, but loosely, an inhabitant of the United States. YAN'KEEISM, n. *-ĭzm,* anything peculiar to the Yankees in language, etc.

YANKEE DOODLE: popular air known originally as *Nankee Doodle.* It is as old as the time of Cromwell. It was known in New England before the revolution; it is said to have been played by the British troops about 1775 in derisive allusion to the then popular nickname of the New Englanders; and afterward the New Englanders, saying that the British troops had been made to dance to *Yankee Doodle,* adopted the air. Though this

tune is not discarded as a national air, it probably yields precedence to *Hail, Columbia.*

YANKEE GANG: a term used in saw mills for an arrangement adapted for logs 21 in. diameter and under. It consists of two sets of gang saws, having parallel ways in the immediate vicinity of each other. One is the slabbing gang, and reduces the log to a balk and slab boards. The balk is then shifted to the stock gang, which rips it into lumber.

YANK'TON, S. Dak.: city, county-seat of Yankton co.; on the Missouri river, and on the Chicago, Milwaukee and St. Paul, the Great Northern, and the Chicago and Northwestern railroads; 60 m. n.w. of Sioux City and 135 m. n.w. of Omaha, Neb. It has steamer connection with the Missouri river ports. The city is the commercial and industrial centre of a large agricultural and stock-raising region. The chief industrial establishments are Portland cement works, breweries, pork-packing establishments, flour mills, woolen mills, brick yards, grain elevators, and stock yards. The city owns and operates the water-works. The educational institutions are Yankton College (Congregational), opened in 1882; St. Joseph's Academy, a public high school, public and parish elementary schools. It has the South Dakota Hospital for the Insane and a hospital in charge of the Sisters of St. Benedict. Yankton's water supply is obtained partly from artesian wells. There are two national banks, one state, and the American Mortgage Co.; the four have a combined capital of $175,000. The government is administered under a revised charter of 1885, which provides for a mayor, who holds office one year, and a council. Yankton was settled by eastern people in 1862, and in 1883 received a city charter. Until 1883 it was the capital of the territory of Dakota. Pop. (1890) 3,670; (1900) 4,125; (1910) 3,787.

YANKTON COLLEGE: located at Yankton, S. Dak. It was established by the General Association of Congregational Churches of Dakota in 1881, and opened to students in 1882, and is the oldest institution of higher learning in the Dakotas. The majority of the corporate body which elects the trustees must be members of Congregational churches; otherwise the college is non-sectarian. It is open to both men and women. The organization includes the following departments: (1) the college; (2) the academy; (3) the Conservatory of Music; (4) the department of art; (5) the department of elocution; (6) the department of physical training; (7) the department of stenography. Gymnasium work is required of both men and women, and there is also an athletic park, and ample provision for athletic sports. The students maintain Young Men's and Young Women's Christian associations, literary societies, a branch of the Inter-Collegiate Oratorical Association, and athletic associations. The college has an attractive campus of 25 acres,

including the Athletic Park (5 acres) to the north of the main campus, and Observatory Hill to the south. The buildings are Middle College, Dakin Hall, the Ward Hall of Science, Clarke Observatory, and the gymnasium; a new library building, the gift of Andrew Carnegie, was in process of construction in 1904. A summer school was established in 1903. The students number 350.

YAOURT, n. *yâ-ôrt':* a fermented liquor, similar to *koumiss,* prepared by the Turks from milk.

YAP, v. *yăp* [imitative: F. *japper,* to yelp]: to yelp or bark, as a dog: N. the yelp or bark of a dog. YAP'PING, imp.: ADJ. barking; snapping. YAPPED, pp. *yăpt.*

YAPOCK: a small, rat-like marsupial (*Cheironectes variegatus*) of the opossum family (*Didelphyidæ*), which is found in Central and South America. It is rather larger than a common rat, with large, naked ears, and a long, nearly naked, tail; fur brown above, with three transverse bright gray bands, interrupted in the middle, white below. It differs from the opossums in having webbed hind feet and being an expert swimmer and diver. Its habits closely resemble those of the otter, and it feeds on fish, crabs, and other aquatic animals.

YAPURA, or JAPURA: a river in Colombia and Brazil, South America, a tributary of the Amazon. It is about 1,800 m. long; and fully one-half its course is navigable for steamers. At lat. 1° 10′ s. and long. 72° 20′ w. navigation is interrupted by a large cataract.

YAR, or YARE, *yâr:* river of the county of Norfolk, England; rising about the middle of the county, and flowing e. past Norwich. Receiving the Waveney, it widens into the estuary of Breydon Water; is joined by the river Bure at Great Yarmouth; and 2½ m. below that point it enters the North Sea, after a course of about 30 miles.

YARD, n. *yârd* [Icel. *garthr,* a fence, a hedge: AS. *geard,* an inclosure: Dut. *gaard;* OHG, *garto,* a yard, court: allied to L. *hortus,* a garden: Gr. *Chortos,* a court-yard]: an inclosure in which any work is carried on, as a tan-*yard,* a dock*yard;* an inclosed space adjoining or inclosing a house or building, as a barn-*yard;* in *Scot.,* an inclosed garden, as a kale-*yard* (or cabbage-garden): V. to put or confine cattle in a yard. YARD'ING, imp. YARD'ED, pp. YARD-LAND, the area of land, varying in extent from 15 to 40 acres, held by a tenant in villeinage in early English manors.

YARD, n. *yârd* [AS. *gyrd, gierd;* Ger. *gerte,* a wand, a measuring-rod: Dut. *garde,* a rod]: a staff or rod 3 ft. long, the unit of long measure throughout the British empire and the United States; the yard contains 3 ft. and each foot 12 in.; a measure or length of 3 ft. or 36 in.; in a *ship,* a long piece of timber tapering toward each end, slung horizontally by its centre to a mast, and used for suspending certain of the sails, which are called

square sails if the yard is suspended at right angles to the mast, and lateen sails if suspended obliquely. It is upheld by the 'lifts,' and trimmed to suit the wind by the 'braces.' The lower sails or courses are upheld by the main, fore, or mizzen yards. Above these are the topsail-yards, the topgallantsail-yards, and the royal-yards. YARD-ARM, one-half of a ship's yard, from the centre or mast to the end. YARD-STICK, a stick or rod a yard long used in measuring. YARD-WAND, measure of a yard made of a rod or strip of wood.

YARE, a. *yär* [AS. *gearo*, accurate, ready: Dut. *gaar*, dressed: OHG. *garo*, ready]: in *OE.*, nimble; dexterous; ready; answering readily to the helm (as a ship); prompt or swift in movement: AD. in *OE.*, readily; dexterously. YARELY, ad. *yär'lĭ*, in *OE.*, dexterously; skilfully.

YARKAND, *yâr-kând'*, or YARKEND', *-kĕnd':* town, commercial capital of E. Turkestan; on the Yarkand river, in the s.w. corner of the country, s.e. of Cashgar; 38° 25′ n. lat., 77° 16′ e. long.; about 4,100 ft. above sea-level. It is in the principal oasis of E. Turkestan, and is the centre of a group of smaller towns. The waters of the Yarkand and its tributaries are led everywhere through this oasis for irrigation by means of innumerable canals. There is much mineral wealth in the mountains. The population of the oasis is estimated about 200,000. The city of Yarkand is renowned for its saddlery and leather-ware. It is surrounded with a thick earthen wall, with towers in the Chinese style. The people are Persians (who speak no longer their mother-tongue, but Turkish) and Turkish Sarts. Until Yarkand was visited by Mr. Shaw, in 1868, we had little reliable information concerning it. He found it to contain long streets, covered in against the rays of the sun, with rows of fine shops, in which goods of every sort, and from every country, were exhibited. He found the bread excellent; the supply of vegetables varied and abundant; the butchers' shops well provided with horse-flesh, camel beef, and mutton. The population seemed industrious, orderly, and well skilled in many of the arts of civilized life. In 1877 Eastern Turkestan was retaken by the Chinese, and Chinese rule was re-established at Yarkand. See Shaw's *High Tartary, Yarkand, and Cashgar* (1871); Boulger's *Life of Yakoob Beg* (1878). Pop. 75,000 to 100,000.

YARMOUTH, Canada: a town and port of entry of Yarmouth co., Nova Scotia; on the Bay of Fundy, the Atlantic Ocean, and the Dominion Atlantic railroad; 90 m. s. of St. John, N. B. The town has extensive fishing, shipping, and manufacturing interests, electric lighting, and street railways. At the head of its educational institutions is Yarmouth Seminary. Pop. (1901) 6,430.

YARMOUTH, Maine: town in Cumberland co.; on

Casco Bay, the Royals river, and on the Grand Trunk railroad; 10 m. n.e. of Portland. It contains four villages. It has a foundry, paper and cotton mills, and granite quarries. The town has six churches, North Yarmouth Academy, a high school, graded schools, and a public library. Pop. (1900) 2,274; (1910) 2,358.

YARMOUTH, Great: England, a seaport town in the county of Norfolk, 22 m. e. of Norwich, on a narrow slip of land between the Yare and the sea, and connected by a bridge over the Yare with Little Yarmouth, or South Town, in Suffolk. The older part, near the river, is remarkable for the number of narrow lanes at right angles to the main streets, known as the 'rows.' Between the older part of the town and the sea is the modern part, with a marine parade and other attractions. The parish church, founded in 1101, is a very large building, and the market-place is also of great size. There are a fine town-hall, a large custom-house, a fine library and museum, borough jail, a lofty Nelson monument, royal hospital, royal naval lunatic asylum, aquarium, two fine piers, and an ancient jetty. The quay stretches along the river upward of a mile. The harbor is in the Yare, and is accessible by vessels drawing 18 or 19 ft. Immediately off Yarmouth, and parallel to the shore, is a great range of sand-banks, between which and the land is the safe anchorage of Yarmouth Roads. Yarmouth is a great seat of the English herring-fishery, in which about 300 vessels and 3,000 hands belonging to the port are employed; many hands are likewise engaged in the mackerel fishery, and in that for cod and other whitefish. Many of the fish are cured, the cured herrings known as 'Yarmouth bloaters' being celebrated. There are malting-houses, boat-building yards, rope-works, silk-crape factories, trawl-net works, etc. Yarmouth has risen into considerable importance as a watering-place. Pop. (1901) 51,250.

YARN: any textile before woven into cloth. Cotton yarn is numbered according to the number of hanks contained in a pound of 7,000 grains. Each hank, or skein, measures 840 yards. Worsted yarn has 560 yards to the skein; woolen yarn has 1,600 yards to the skein, or run. Linen yarn is wound upon reels, and made up into leas, hanks, and bundles. Flax and jute yarn is numbered according to the number of leas of 300 yards per pound.

YAR-NUT, n. *yâr'nŭt* [see Arnott]: the earth-nut; the pig-nut.

YAROSLAV'. See Jaroslav.

YARPHA, n. *yâr'fa* [etym. doubt.]: a kind of peaty soil; a soil in which peat predominates.

YARRA-YARRA, Australia: the river of Victoria on which Melbourne stands. It is about 100 m. long, but is not navigable above Melbourne, owing to its falls.

YARRELL, William: English naturalist: b. London

1784, June; d. Yarmouth, Norfolk, 1856, Sept. 1. Led to note carefully the habits of birds and fishes in 1825, he sent his first contribution to the *Zoological Journal*, a notice of some rare British birds observed in the years 1823-5. The same year he became a member of the Linnæan Society, to whose *Transactions* he repeatedly contributed interesting papers on the subject of birds, and in 1849 became its vice-president. His chief work is his *History of British Birds* (1839-43, 4th revised edition 1881-5). He also published *The History of British Fishes* (1835-6).

YARROW, Harry Crécy: American physician: b. Philadelphia, Pa., 1940, Nov. 19. He was graduated from the medical department of the University of Pennsylvania in 1861, and during the civil war served as surgeon of the 5th Pennsylvania cavalry. He was surgeon and naturalist in the expedition to explore the territory west of the 100th meridian, and has been acting assistant surgeon of the United States army for more than 30 years. He is the author of *Introduction to the Study of Mortuary Customs Among North American Indians*, and various biological and ethnological monographs.

YARROW, Scotland: a celebrated pastoral stream in Selkirkshire, which rises at Yarrow Cleugh, and, running east a few miles, forms a beautiful lake, called the Loch of the Lowes, which discharges its water into St. Mary's Loch. Issuing from the latter, the river, after a course of 16 m. through the district of Ettrick Forest, flows into the Ettrick near Selkirk. It is famous in Scottish song, and has been celebrated in poems by Scott, Wordsworth, and others.

YARROW: an erect, hairy composite herb (*Achillea millefolium*), sometimes called milfoil. The terminal corymbs of small white, or occasionally rose-colored flowers, are large, compound, and fastigiate. The leaves are from 2 to 4 in. long, and are cut into numerous fine segments, which are very pubescent. Yarrow is a common plant of roadsides, and has been introduced from Europe. It has been used for a long time as a tonic and astringent and enters into an ointment for dressing wounds. Several species of *Achillea* are garden plants. Sprigs of yarrow plucked from a young man's grave, by lovesick maidens, who repeat meantime a mystic formula, are expected to invoke the images of their lovers, in dream.

YARUMAL, Colombia: a town in the department of Antioquia, on the Cauta, 50 m. n.e. of Medellén. Gold mining and stock-raising are the chief industries. Pop. est. 9,000.

YATAGHAN: the Turkish name for a sort of dagger-like sabre with double-curved blade, about 2 ft. long, the handle without a cross-guard, much worn in Mohammedan countries.

YATES, *yāts*, ABRAHAM: statesman: 1724, Aug. 23—1796, June 30; b. Albany, N. Y. He was president of the provincial congress 1775-6; state senator of New York 1777 and 1779-90; member of the continental congress, and at the same time receiver of Albany, 1788-9. and mayor of that city 1790-96. He was active in promoting the cause of the revolution, alike by voice and pen, writing an able series of articles under the name 'Sidney' and other signatures.

YATES, EDMUND HODGSON: journalist: 1831, July—1894, May 20; b. London; son of an actor. He was for some years chief of the missing-letter reply in the post-office, until 1872, when he visited and lectured in the United States. He had been dramatic critic in London for the *Daily News*, and editor of *Temple Bar Magazine*, and of *Tinsley's Magazine;* in 1873-4 he represented the New York *Herald*. In 1874 he established the *World*, of which he was both editor and proprietor. Beginning with *My Haunts and Their Frequenters* (1854), he published many books, especially novels, including *Black Sheep*, a serial (1866-7); *Wrecked in Port* (1869); *Dr. Wainwright's Patient*, and *Nobody's Fortune* (1871); *The Yellow Flag* (1873); *The Impending Sword* (1874); and *Personal Reminiscences* (2 vols. 1884). He was indicted for libel by the Earl of Lonsdale 1884, and sentenced to four months' imprisonment, but was released after two months.

YATES, JOSEPH CHRISTOPHER: jurist and state official: 1768, Nov. 9—1837, Mar. 19; b. Schenectady, N. Y.; grand-nephew of Abraham Yates. He practiced law in his native place; was mayor 1798-1808; state senator 1806-7; judge of the supreme court 1808-22; and governor of the state 1823-25. He was one of the founders of Union College. Yates county, between Seneca and Canandaigua lakes, was named in his honor. He died in Schenectady.—His father, CHRISTOPHER YATES (1737-85), was a surveyor of land, and, in the revolution, a colonel of engineers; he served also as quartermaster-general under Gen. Schuyler.

YATES, RICHARD: American politician: b. Warsaw, Ky., 1818, Jan. 18; d. St. Louis, Mo., 1873, Nov. 27. He was graduated at Illinois College, Jacksonville, in 1838; practiced law at Springfield, Ill., sat in the state legislature 1842-9, and was sent to congress as a whig in 1850. In 1860 and 1862 he was governor of Illinois. He was a strong opponent of slavery, and an ardent supporter of the government during the civil war, taking an active part in the organization of volunteer regiments. He was United States senator in 1865-71, and afterward United States railroad commissioner.

YATES, RICHARD, LL.D.: American politician: son of the preceding: b. Jacksonville, Ill., 1860, Dec. 12. He was graduated from Illinois College in 1880 and from the law department of the University of Michigan in

1884. After being city attorney of his native place, 1885-91, he was county judge of Morgan co., Ill., 1894-7, and collector of internal revenue at Springfield, Ill., 1897-1900. In 1901 he was elected governor on the republican ticket of Illinois for the term ending 1905.

YATES, Robert: American statesman and jurist: b. Schenectady, N. Y., 1738, Mar. 17; d. Albany 1801, Sept. 9. He was educated and studied law in New York, and after his admission to the bar (1760) settled in Albany, where at the commencement of the revolutionary troubles he was a member of the committee of public safety (1775). In 1775-7 a member of the provincial congress of New York. He was a member of the convention that framed the constitution of the state (1776), in 1777 was appointed judge of the supreme court of New York, and in 1787 was a member of the convention that framed the constitution of the United States. His notes of the secret proceedings and debates of this convention were printed after his death (1839). In 1790 he was appointed chief justice of the state of New York. On his retirement from the bench in 1798 he was appointed a commissioner to settle disputed titles to lands in the 'Military Tract' with Massachusetts and Connecticut.

YATES, William: philanthropist: 1767, Nov. 13—1857, Mar. 7; b. Sapperton, England. He studied medicine under the distinguished Abernethy, was connected with St. Bartholomew's Hospital, London, and in 1790 built and conducted at his own expense ($35,000) a hospital for the pauper insane at Burton-on-Trent. Removing to Philadelphia 1799, he became well known as an earnest advocate on the then new discovery of vaccination. Afterward and until his death he resided in Butternuts, Otsego co., N. Y.

YATES CENTRE, Kan.: city, county-seat of Woodson co.; on the Missouri Pacific and the Atchison, Topeka and Santa Fe railroads; about 90 m. e. by n. of Wichita. It is in a productive farming region. It has industries connected with farm and dairy products, stock-raising, and marketing of wheat, corn, and fruit. There are six churches, a high school, graded elementary schools, and a school library. It has two banks, one national and one state. Pop. 1,870.

YAW, v. *yaw:* to rise in blisters which break into white froth, as in cane-juice.

YAW, v. *yaw* [Norw. *gaga,* to bend backward; prov. Ger. *gagen,* to rock, to shake]: to steer wild or out of the line of her course, as a ship: N. a temporary deviation of a ship from a direct course, generally due to bad steering on the part of the helmsman, or the bad steering qualities of the ship itself. Yaw'ing, imp. Yawed, pp. *yawd.*

YAWL, n. *yawl* [Dut. *jol,* a yawl, skiff: Sw. *julle;* Dan. *jolle,* a yawl]: a light and rather narrow boat be-

longing to a ship, usually rowed by four or six oars; also, a decked boat having two masts, on the first of which are a lugsail and topsail; and on the aftermast (a kind of jigger rising almost from the sternpost) a driver or fore-and-aft sail.

YAWL, v. *yawl* [prov. Ger. *jaueln;* Swiss, *jaulen,* to lament, to wail: Icel. and Norw. *gaula,* to bellow: allied to YELL]: to cry; to howl like a dog; to yell. YAWL'ING, imp. YAWLED, pp. *yawld.*

YAWN, v. *yawn* [AS. *gánian;* OHG. *geinon;* Icel. *gina;* Ger. *gähnen,* to gape, to yawn]: to gape; to open or stand wide; to open wide the mouth through drowsiness, weariness, hunger, etc.; hence, to long or be eager: N. a gaping; an opening wide. YAWN'ING, imp.: ADJ. opening or gaping widely: N. the act of gaping or opening the jaws wide. YAWNED, pp. *yawnd.* YAWN'INGLY, ad. *-lĭ.*

YAWNING: gaping. This may be the simple result of deficient oxygenation of the blood, or may be brought on by the mere sight of the act in another person; and it is a modification of the ordinary movements of respiration, in which the inspiration is deeper than usual, and is accompanied by a kind of spasmodic contraction of the muscles which depress the lower jaw, and by a great elevation of the ribs and to some degree of the shoulder-blades. 'The purely involuntary character of the movement is sometimes seen in a remarkable manner,' Carpenter says, 'in cases of palsy, in which the patient cannot raise his shoulder by an effort of the will, but does so in the act of yawning. Nevertheless, this act may be performed by the will, though not completely; and it is one that is particularly excited by an involuntary tendency to imitation, as every one must have experienced who has ever been in company with a set of yawners.'

YAWS: a disease occurring in Africa, America, Samoa, Java, and tropical regions in many parts of the world. It is almost wholly confined to the African races. It is characterized by cutaneous yellowish tumors, numerous and successive, gradually increasing from specks to the size of a raspberry, one at length growing larger than the rest; core a fungous excrescence; fever slight, and probably irritative merely. It is contagious, but cannot be communicated except by the actual contact of yaw matter to some abraded surface, or by inoculation, which is sometimes effected by flies. It is also called frambœsia, from the French *framboise,* a raspberry. Some regard it as a form of syphilis.

YAZD, *yâzd,* or YEZD, *yĕzd:* city of w. Persia, capital of the district of Yazd; 190 m. s.e. of Ispahan; on the s.w. of the great desert of Khorassan; lat. 32° 10′ n., long. 54° 50′ e. It is the great emporium of the internal commerce of the empire. Manufactures of silk stuffs, velvets, cotton and woolen fabrics, arms, and loaf-sugar

are carried on, and the bazaars are spacious and well supplied. The population includes about 4,000 Guebres, who are exempt from military service, and are now said to be well treated, both by the authorities and by the inhabitants. Yazd stands on a comparatively small oasis, beyond which is the salt desert, whose shifting sands threaten to encroach on the town, as they swallowed up Old Yazd, whose ruins are still visible 10 m. n.w. Pop. (1900) 50,000.

YAZOO, *yâ-zô':* river of Mississippi, formed by union of the Tallahatchee and Yalabusha; flowing s. and s. by w. in a very serpentine course, in a deep, narrow, sluggish channel, between fertile cotton plantations, and emptying into the Mississippi river, 12 m. above Vicksburg. It is 290 m. long, and navigable at all seasons.

YAZOO: city, capital of Yazoo co., Miss.; on the Yazoo river, and on the Illinois Central railroad; 48 m. n.e. of Vicksburg, 48 m. n. by w. of Jackson. It is in a rich corn and cotton growing region, and, as the river is navigable for more than 200 m. above the city, is an important cotton-shipping point. The city has 8 churches, academy, public schools, cotton-mills, cotton-compress, cotton-seed oil mill, bank, and weekly newspapers. Pop. (1900) 4,944.

YAZOO FRAUD, The: a name given to the sale of lands in the western part of Georgia by a corrupt legislature, to certain large companies in 1789. This action caused great excitement and bitter controversy until settled by the United States supreme court in 1810.

YCLAD, pp. *ē-klăd'* [AS. *ge-*, and *clad*]: in *OE.*, clad; clothed. See remarks under Y-.

YCLEPED, or Yclept, pp. *ē-klĕpt'* [AS. *ge-*, and *clypian,* to call]: 'named,' 'called.' See remarks under Y-.

YDANT. See Eident.

YDRAD, pp. *ē-drăd'* [AS. *ge-*, and *dread*]: in *OE.*, dreaded.

YE, pron. *yē* [AS. *ge;* Dan. and Sw. *i;* Dut. *gij;* Goth. *jus;* Ger. *ihr,* ye]: the pron. of the second person—being the plu. of *thou*—now used only in formal discourses, *you* being the plu. form usually employed.

YEA, ad. *yā* [AS. *gea,* yea, yes: Goth., Ger., and Dut. *ja,* yes]: yes; it is so; indeed; verily; true; truly: N. an affirmation or affirmative vote; hence one who votes in the affirmative. *Note.*—Yea, yes, and Nay, no, were formerly used in answering affirmative questions; Yes and No in answering negative questions. This distinction is still observed provincially. As terms in general use *yea* and *nay* are now obsolete or provincial.

YEAN, v. *yēn* [AS. *canian.* to bring forth young, as a sheep]: to bring forth young as a sheep or goat; to lamb. Yean'ing, imp. Yeaned, pp. *yēnd.* Yean'ling, n. a lamb or kid. Also spelled Ean.

YEAR.

YEAR, n. *yēr* [AS. *gear;* Dut. *jaar;* Dan. *aar;* Goth. *jer;* Ger. *jahr;* Icel. *ár*]: the period of time required for one revolution of the earth round the sun, or more accurately the interval between one vernal equinox and the next, or 365 days, 5 hours, 48 minutes, 46 seconds of solar mean time. This is called the tropical, astronomical, or solar year; the common year contains 365 days, and is usually reckoned from Jan. 1 to Dec. 31 (inclusive), but may be a space of 12 calendar months, reckoned from any particular date (see below); also the time of a planet's revolution round the sun, as the *year* of Mercury or of Venus. YEARS, n. plu. *yērz*, age, or old age. YEAR'LING, n. *-lĭng,* a beast in the second year of its age: ADJ. that is a year old. YEAR'LY, a. *-lĭ*, happening or coming every year; annual; lasting a year; comprehending a year: AD. once a year; annually. LEAP-YEAR, every fourth year (but see LEAP-YEAR), which is made to consist of 366 days, February having in a *leap-year* 29 days. CIVIL YEAR, the year adopted by a nation for the computation of time—previous to 1752 the civil year in Great Britain began Mar. 25. LUNAR YEAR, the period of 12 lunar months, or 354 days. COMMON YEAR, a year of 365 days. JULIAN YEAR, the year established by Julius Cæsar, consisting of 365 days for three years, and 366 days for every fourth year. GREGORIAN YEAR, the corrected Julian year, now adopted by most civilized nations (see CALENDAR). SABBATIC YEAR, among the *anc. Jews,* every seventh year, during which the land was suffered to lie untilled. SIDEREAL YEAR, the time in which the sun, starting from the place of any fixed star, returns to the same position. YEAR OF GRACE, any year of the Christian era, called *Anno Domini,* usually contr. into A.D. YEAR-BOOK, a book published every year, and containing either seasons, festivals, fairs, etc., for the year, or a digest of information in regard to the happenings of a year, as the statesman's *year-book.*

YEAR: a complete course of the seasons, or a complete revolution of the Earth (q.v.) round the sun. The length of the year was determined variously by the nations of antiquity, the earliest method being the conventional one of making it include a certain number of lunar months; the lunar month being, after the day, the first period of time which was fixed. Twelve lunar months, giving a year of 354 days, were first taken as a near approach to a course of the seasons. This, though an approximation to the true value of a year, was soon found defective by more than 11 days; and it became necessary to intercalate these 11 days, in order to preserve the year in a constant relative position to the seasons. The intercalation was variously effected: thus, the Egyptians, who knew the year of 365 days previous to B.C. 1500, divided it into three seasons ('Winter,' 'Summer,' and 'the Nile,' i.e., *the inundation of the Nile*) of four months each, made each month contain 30 days, and

introduced five intercalary days at the end of the 12th month; the Greeks, who generally retained the lunar year of 354 days, added 3 months in the course of every 8 years, giving an additional month to the 3d, 5th, and 8th year of each cycle; the Romans also added additional days, but their system of intercalation was continually changed, not always for the better, till Julius Cæsar caused the adoption of the solar year. The Romans likewise abolished, in Asia, Egypt, and all the other countries under their sway, the old method of reckoning by lunar years, and compelled the adoption of the Julian calendar, according to which the year was assumed to contain 365 days 6 hours. The substitution of the Gregorian calendar in the 16th century introduced for the average length of the solar year 365 days 5 hours 49 minutes, which differs by only a few seconds from its true value; and this small annual error, as well as the excess of the true year over the year of 365 days, is compensated for by means of a succession of *Leap-years* (q.v.).

The time at which the year began varied much among different nations. The Carthaginians, Egyptians, Persians, Syrians, and other Eastern peoples began their year at the autumnal equinox, at which time the civil year of the Jews also began, though their sacred year was reckoned from the vernal equinox. The commencement of the Greek year was at the winter solstice before Meton's time, and was then changed to the summer solstice. The Romans were the first to adopt Jan. 1 as the first of the year, but for some time their example was not followed by subsequent European nations. In France the beginning was Mar. 1 under the Merovingians, Mar. 25 under the Carlovingians, Easter under the Capetians, and Jan. 1 from 1564. The ecclesiastical year in Europe generally began Mar. 25 (see DATE). The ancient northern nations reckoned their year from the winter solstice; the Russians, till Peter the Great's time, from Sept. 1, and the same reckoning, known as the Byzantine era, was in use in the Eastern Empire. Of necessity, the beginning of the year among Mohammedan nations has no fixed position in relation to the sun's course or the seasons, it being invariably a lunar year. In astronomy there are several kinds of years, depending on the various configurations of the earth in its orbit, and consequently varying in length. First there is the *tropical* or (as it is sometimes incorrectly called) *solar* year, which, from its being recognized in legislation and history, and commonly applied in the measure of time, has received the name also of *civil* year: this year is defined as the time which elapses from the sun's appearance on one of the tropics to its return to the same, and has a mean length of 365.2422414 mean solar days, or 365 days 5 hours 48 minutes 46 seconds. Next is the *sidereal* year, which is the period required by the sun to move from a given star to the same star again; and this year, affected as it is

by Nutation (q.v.) only, is one of the most invariable quantities which nature presents us with, and has a mean value of 365.2563612 mean solar days, or 365 days 6 hours 9 minutes 9.6 seconds. The time which elapses between the earth's arrival at its Perihelion (q.v.) and its return to the same position is known as the *Anomalistic* Year (q.v.), and is equivalent to 365.2595981 mean solar days, or 365 days 6 hours 13 minutes 49.3 seconds. The sidereal and anomalistic years have a merely astronomical importance.

YEAR AND A DAY, in Law: the period of time beyond which, in certain cases, rights, privileges, or liabilities do not continue. Thus, if an estray or a wreck is not claimed within the space of one year and an added day, the original owner cannot recover; or if a person wounded by another dies within that time, his death may be reckoned murder; or if a year and a day have elapsed after signing a judgment, no execution can be issued except by renewal of legal process. In the law of all Gothic nations *a year and a day* meant a year and six weeks.

YEARDLEY, *yērd'lĭ*, Sir GEORGE: governor of Virginia: about 1580-1627, Nov.; b. England. He emigrated to Virginia, and was appointed deputy-governor 1616, on Sir Thomas Dale's return to England. He was displaced 1617 by Samuel Argall, who proved arrogant and unpopular, and Yeardley was reinstated 1619. He annulled the tyrannical martial law which had oppressed the planters, and granted an annual general assembly, the first representative assembly in this country. He was superseded 1621 by Sir Francis Wyatt, but again reelected 1626, and the colony greatly prospered under his administration. He died in England.

YEARN, v. *yėrn* [Goth. *gairns,* desirous: Icel. *giarn,* desirous; *girna,* to desire: Scot. *girn,* to weep, as a child becoming peevish from earnest desire of any object]: to be filled with long desire; to have a great desire toward an object or end; to feel great uneasiness from a longing desire toward, or pity for some person or thing; to long; in *OE.,* to grieve. YEARN'ING, imp.: ADJ. having longing desire: N. strong emotions of desire, tenderness, or pity; state of being moved with a longing desire. YEARNED, pp. *yėrnd.* YEARN'INGLY, ad. *-lĭ.*

YEAST, n. *yēst* [Ger. *gäscht,* froth of beer: Icel. *jastr,* the rustling of leaves, the scum on sour milk: AS. *gist,* a blast of wind, yeast: Dut. *gest;* Dan. *giær,* yeast: comp. Gr. *zestos,* fervent]: the froth in the working of new beer; a fungus used to bring about alcoholic fermentation; the preparation used for raising dough for bread; barm. YEAST'Y, a. *-ĭ,* or YESTY, a. *yĕst'ĭ,* abounding with yeast; frothy; foamy. YEAST'INESS, n. *-nĕs,* the state or quality of being yeasty. YEAST-BITTEN, in *brewing,* the phrase used when the top barm happens to

re-enter the body of the beer. YEAST-PLANT, a particular form of fungus which is composed of simple cells, and which will go on increasing by budding for an indefinite time if placed in a saccharine liquid, converting the sugar into alcohol and carbonic acid. YEAST-POWDER, a substitute for yeast in the form of a powder, prepared from soda and other substances.

YEAST: barm. In the process of fermentation of saccharine fluids containing albuminous matter, as in brewing or wine-making, the originally clear fluid becomes turbid, carbonic acid is evolved, and the substance causing the turbidity gradually separates in a foaming mass of bitter taste and acid reaction. This is yeast; and on examining it under the microscope, it is found to consist essentially of aggregations of small oval cells of vegetable nature, known as the yeast-cells, yeast-plant, or *Torula* (otherwise *Saccharomyces*) *cerevisiæ* (q.v.). Yeast, as is well known, has the property of setting up fermentation in saccharine solutions; and beer-yeast, a familiar kind, possesses, according to Prof. Miller, this power in the highest degree, as may be shown by dissolving 4 parts of pure cane-sugar in 20 parts of water, and adding 1 part of fresh yeast: if this mixture be exposed to a temperature of about 80°, in less than an hour fermentation will have begun (see FERMENTATION). The investigations of Mitscherlich have led chemists to distinguish two varieties of yeast—the *Ober-hefe*, or surface-yeast, and the *Unter-hefe*, or sediment-yeast, the former collecting on the surface of the fermenting fluid, and the latter forming a sediment. Surface-yeast is propagated by buds (see TORULA CEREVISLÆ), and sediment-yeast by spores; and each variety produces specified results on the fermenting fluid. The fermentation induced by the surface-yeast is rapid and irregular; while that produced by the sediment-yeast is slow and quiet. The surface-yeast is formed when the saccharine fluid ferments at a temperature of 65° to 77°; while the sediment-yeast is produced chiefly when fermentation takes place at the lower temperature of 32° to 45°. In their chemical relations the two varieties present no apparent difference. On treating yeast with a solution of potash, a cellulose-like substance remains, while an albuminate is dissolved. The action of yeast is destroyed by exposing it to a temperature of 212°, by alcohol, by the strong mineral acids, chlorine, iodine, and bromine, oxide of manganese, creosote, etc.; on the other hand, yeast may be dried at a low temperature or by pressure, and may be preserved in this state without losing its activity. The part which the globules of yeast play in exciting the conversion of sugar into alcohol and carbonic acid is very obscure; but an experiment of Mitscherlich seems to show that the sugar ferments only in those points which are in actual contact with the globules. Pasteur's experiments render it probable that the process of fermentation is

connected with the assimilation of the sugar by the yeast-plant during the development of the yeast-globules, or, in other words, that 'the essential condition of fermentation is the conversion of albuminoid matter into organized globules.'

According to Mitscherlich's analysis, the cells of ordinary washed yeast in a condition to excite fermentation contain (the ashes being deducted): carbon 47.0; hydrogen 6.6; nitrogen 10.0; sulphur 0.6; oxygen 35.8; while spent yeast (after fermentation had ceased) contained only 5 of nitrogen. The inorganic matter amounted to 7.3 per cent of the dried yeast, and consisted entirely of phosphates.

For economic uses of yeast in bread-making, brewing, etc., see the respective titles. Beer-yeast (*Cerevisiæ fermentum*) is an article of the Pharmacopœia: it is employed as a stimulant in advanced stages of low fevers, and is serviceable especially in cases where, in consequence of inflammatory symptoms, wine is inadmissible. Neligan has found it of great service in intense tympanitis following parturition. The dose is two tablespoonfuls every three hours, and it may be given in camphor mixture or peppermint water. Yeast-poultice forms an excellent stimulating application to foul and irritable sores. It is composed as follows: Take of yeast 6 fluid ounces; flour, 14 ounces; water heated to 100°, 6 fluid ounces: mix the yeast with the water, and stir in the flour; place the mass near the fire till it rises. This poultice should be renewed every 6 or 8 hours. Its special efficacy depends on the carbonic acid gas which it evolves.

If surface-yeast or under-yeast be collected and placed on a cloth to drain, and then pressed until nearly dry, it can be kept with care for several months, and in that state is what is called GERMAN YEAST, in which an immense trade has sprung up. It is obtained mostly from great distilleries, and is in large use by bakers. PATENT YEAST is exactly similar, but is raised from a wort made purposely from malt and hops. ARTIFICIAL YEAST is a dough of wheat or other flour, mixed with a small quantity of common yeast, and made into small cakes, which are dried. If kept free from damp, it long retains its fermentive power.

YEATES, *yēts,* WILLIAM SMITH, B.A., M.A.: American geologist: b. Murfreesboro, N. C., 1856, Dec. 15. Graduated from Emory and Henry College (Emory, Va.) in 1878, he was connected with the United States Fish Commission in 1879 and 1880-1, and in 1881-93 was successively assistant, acting curator, and assistant curator of the United States National Museum, in charge of the minerals and gems. He was professor of mineralogy in the Corcoran Scientific School of Columbian University (Washington, D. C.) in 1884-93, professor of geology in

1890-3. In 1893 he was appointed state geologist of Georgia.

YEATS, William Butler: Irish author: b. Dublin 1865, June 13. He obtained a secondary schooling in England and Ireland, was for three years a student of art, but turned to literature in 1886. He was a leader in the foundation of the Irish Literary Society and the National Literary Society of Dublin, and a prime mover in the Irish Independent Theatre, thus becoming one of the chief representatives of the so-called Celtic revival. In 1903-4 he lectured in the United States on subjects connected with this movement. With E. J. Ellis he edited *The Works of William Blake* (1893), and *Ideas of Good and Evil* (1903). Among his various further publications in prose and verse are: *The Wanderings of Oisin* (1889); *John Sherman* (1891); *The Celtic Twilight* (1893); *A Book of Irish Verse* (1895); *Poems* (1895); *The Wind Among the Reeds* (1899); *The Shadowy Waters* (1900); and *Cathleen ni Hoolihan* (1902).

YED'O. See Tokio.

YEDO, *yĕd'ō*, Bay of: inlet of the n. Pacific, on the s.e. coast of the island of Nippon, Japan; 35°—35° 40′ n. lat., and intersected by the 140th meridian of e. long. The city of Yedo is at its n.w. extremity. The depth of water, nowhere great, decreases all along the banks toward the town, which, at low water, cannot be approached within a mile even by a boat. Solid batteries of granite, well kept, and in general aspect not unlike those of Cronstadt, have been erected midway between the anchorage and the shore.

YE'ISK. See Jeisk.

YEKATERINBURG'. See Ekaterinburg.

YEKATERINOSLAV'. See Ekaterinoslav.

YELATOM'. See Jelatom.

YELETZ'. See Jeletz.

YELIZAVETPOL' or Elizabethpol'. See Elizabetopol.

YELK, n. *yĕlk:* same as Yolk (q.v.).

YELL, v. *yĕl* [AS. *gyllan;* Icel. *gella;* Dut. *gillen,* to scream: Sw. *gälla,* to ring, to resound: Ger. *gellen,* to resound]: to cry with a loud, sharp, disagreeable noise; to scream with agony or horror; to shriek hideously: N. a sharp, loud, hideous outcry, as of agony or horror; a hideous scream. Yell'ing, imp.: Adj. uttering hideous outcries: N. the act of uttering hideous screams; the noise made. Yelled, pp. *yĕld.*

YELL: one of the Shetland Islands, and, after Unst, the farthest n. of that group; separated from Mainland by Yell Sound, and from Unst by Blue Mull Sound; 17 m. long, 5½ m. in average breadth; 83 sq.m. The w. coast is rocky and precipitous, but on the whole the surface

is tame, and consists largely of moorlands—the greatest elevations being no more than 672 ft. above sea-level. Agriculture is in a backward state, and fishing is the chief employment. Pop. about 2,600.

YELLAND, *yĕl'land,* Raymond D.: artist: b. London, England, 1842, Feb. 2. He became a member of the San Francisco Art Association 1874; assistant director of the California School of Design 1877-8, and director 1888. His works include *The Lonely Sea, Half Moon Beach, Sunlight and Shadow, Golden Gate, The Golden Gate at Even, Mount Hood, Mount Tacoma, Columbia River, Faringford, Isle of Wight,* and *Near Dordrecht.*

YELLOW, n. *yĕl'lō* [AS. *geolo, geolu;* Ger. *gelb;* Icel. *gulr;* Dan. *guul,* yellow: L. *helvus,* light yellow—apparently connected with *gold* and *gall*]: one of the primitive or prismatic colors; a bright-golden color; united with blue it yields green, with red it produces orange: Adj. of a pure bright-golden color. Yel'lows, n. plu. *-löz,* a species of jaundice in horses, cattle, and sheep; a disease of trees. Yel'lowish, a. *-ĭsh,* somewhat yellow. Yel'lowishness, n. *-nĕs,* quality of being somewhat yellow. Yel'lowness, n. *-nĕs,* the quality of being yellow; in *OE.,* jealousy. Yellow-haired, a. having hair somewhat yellow. Yellow earth or ochre, a massive earthy mineral of the clay family, of an ochre-yellow color and of somewhat greasy feel—when burnt and prepared it is sold as English-red. Yellow flag or Yellow-jack, a flag hoisted on the masthead of a ship to denote sickness on board, or that she is under quarantine regulations, also over hospitals, etc. Yellow-hammer, or -ammer [Eng. *yellow,* and AS. *amore;* Ger. *ammer,* a bunting]: a small bird of a yellowish color; also called *yellow-bunting* (see below). Yellow metal, or Muntz's metal, an alloy of 3 parts of copper and 2 of zinc, which has the property of being malleable, when hot, and hence can be rolled out in sheets like copper. It is used for sheathing ships. Yellow pine, a name given to both *Pinus mitis* and *P. austrālis,* ord. *Conifĕræ.* Yellow-throat, a small singing-bird of North America, of genus *Geothlypis.* Yellow-quartz, limpid and transparent rock-crystal of a lemon, golden, or wine-yellow color; false topaz and citrine. Yellow-race, n., in *ethnol.,* a term sometimes applied to the Chinese, Japanese, Mongols, Lapps, Esquimaux, etc. Yellow rattle, a common field-plant; *Rhinan'thus crista galli,* ord. *Scrophulariācĕæ.* Yellow-root, a tonic North American plant, *Hydrastis canaden'sis,* ord. *Ranunculācĕæ* (see Hydrastis). Yellow-wood, an Australian timber-tree, *Oxlcya xanthoxyla,* ord. *Cedrelācĕæ*; a tree (*Cladrastis tinctoria*) of Kentucky, Tennessee, and North Carolina, commonly known in cultivation as *Virgilia lutea.* Yellow-wort, a plant with a yellow flower, common in limestone regions: the *Chlora perfoliāta,* ord *Gentianācĕæ.*

YELLOW BERRIES. See French Berries.

YELLOW-BIRD (*Chrysomitris tristis*): bird of the Finch family (*Fringillidæ*), native of North America, where it is very widely distributed. Other names are Goldfinch and Thistle-bird; and sometimes it is called the American Canary. It is rather more than 5 in. in entire length; the male in summer plumage of bright yellow color, with black crown, wings, and tail, upper and under tail-coverts white. The female is yellowish brown above, ashy brown below, and the male assumes a very similar plumage in winter. Yellow-birds are seen often in large numbers, feeding on seeds of thistles and other plants, and seldom alighting on the ground. The nest is made of lichens fastened together with saliva, and lined with soft substances. The song is very pleasing; and it is a sprightly and attractive cage-bird, easily tamed, and capable of being taught tricks. Several allied species are found in w. parts of America.—The name Yellow-Bird is applied also to a warbler, the Summer Yellow-bird or Summer Warbler (*Dendroica æstiva*), the male streaked with reddish below; it is of general distribution in North America.

YELLOW BOOK OF FRANCE: a government publication issued regularly since 1861, designed to furnish historians and others with official information. It is similar to the British Blue Book and the German White Book.

YELLOW BOY: a popular name for a gold coin, formerly much used in the far west. The term originated in Great Britain, the name being applied to the gold sovereign.

YELLOW COPPERAS: a name sometimes used for the mineral copiatite. Crystallization, monoclinic, usually in translucent pearly yellow plates; hardness, 2.5; composition, a basic sulphate of iron; specific gravity, 2.1. Found near Copiapo as an incrustation on coquimbite; also in other places in South and North America.

YELLOW EARTH: a clay or kaolin strongly impregnated with hydroxide of iron or limonite. Its chief use is for pigment.

YELLOW-EYED GRASS: the common name of the genus *Xyris*, composed of rush-like plants, with bright yellow flowers produced from the summit of a naked scape, conspicuous in sandy bogs in July and August. They are mostly of tropical distribution about the world. The yellow-eyed grass (*X. bulbosa*) has a bulbous root; equitant, linear, twisted leaves; an erect, 2-edged, twisted scape; roundish, acute heads, supporting a number of small yellow flowers projecting from between the scales, with perianth and other parts of the flowers in threes. Another species with pretty, large petals (*X. caroliniana*), occurs near the sea from Rhode Island southward. The *X. fimbriata*, a plant 2 ft. high, the divisions of its calyx conspicuously fringed on the wing-margined keel, and

plumose at the summit, is found in the pine barrens of New Jersey and southward. The foliage and roots of *X. indica,* of *X. americana,* and of *X. vaginata,* are used for a remedy for leprosy and the itch, in India, Guiana and Brazil.

YELLOW FEVER: disease formerly endemic in certain low districts in the tropics near the sea, but under certain circumstances sporadic in other places, never appearing beyond 48° n. lat., nor without a temperature of at least 72° F., nor more than 2,500 ft. above sea-level. It is analogous to malaria in its mode of propagation, in that it is spread through the bite of a mosquito; the malarial mosquito is one of the genus *Anophiles,* while the mosquito of yellow fever is of the genus *Stegomyia;* it is possible, however, that mosquitoes of other genus may also be capable of carrying the infection of yellow fever. The disease usually begins suddenly (generally in the night or early morning) with a sense of coldness, rigor, or actual shivering, followed by vascular reaction, as shown by the heat and dryness of the skin, headache, especially over the eyes, and pain of the eyeballs, which are suffused and have a strange drunk-like aspect. The limbs and loins are painful; the tongue is loaded, and its edges are red. There is a peculiar and characteristic flush or suffusion of the face, occupying a zone of about an inch above and below the eyes. Nausea, gastric uneasiness, and a tendency to vomit soon supervene. These symptoms may gradually lessen, and the patient will then regain his ordinary health in 24 or 36 hours; but if the symptoms persist, they soon become more aggravated, and the stomach ejects at first a clear fluid, which soon becomes of dirty-brown tint, and is finally succeeded by the true *black vomit.* A yellow tint on the conjunctiva is observed, which extends to the skin of the face; and as the disease advances, the whole body becomes of yellow color, varying in intensity from a pale lemon to a deep orange tint. The anxious countenance indicates the distress of the patient, who appears agitated by fearful apprehensions or incipient delirium. The skin feels constricted, and is of a pungent heat. The bowels are constipated, and the red, clean, and tremulous state of the tongue indicates the presence of intestinal irritation, consequently the increase of danger. The urine and other excretions are more or less suppressed. Eructations, hiccoughing, and vomiting increase the distress and weakness. The disease in fatal cases usually terminates on the second or third day. The above train of symptoms is not constant: sometimes, when everything seems favorable, black vomit suddenly appears, and the patient immediately succumbs; in other cases, patients experience no symptoms except severe pains in the legs and suppression of urine, and die without taking to their beds. In all cases terminating fatally, albumin appears in the urine on the second or third day. In women the

catamenial discharge is sure to appear, whether due or not. The discharges from the bowels, toward the close of the disease, may be black or dark green, and these evacuations are succeeded by others resembling dark sandy mud. Recent investigations tend to show that the disease, like so many others, is due to the presence of organic germs in the system in this case to a minute protozoan organism in the blood. This germ has not been identified, but its existence is assured because of the analogy of the disease in its mode of propagation to malaria, in which the presence of a microscopic blood parasite has been determined. The usual course of yellow fever in its most concentrated form consists of 12 hours of forming period, 36 or 48 of formed or proper fever, and 24 or 36 of declining or concluding period. When the symptoms are less intense, the patient may survive to the 14th day. In the milder modifications of this disease, the morbid symptoms are prolonged to a considerable extent. Death may occur at any period, and the mode in which it occurs is by syncope (fainting), uræmia (or poisoning of the blood by accumulation of urea), apoplexy, or asphyxia, or suffocation. When the black vomit is plentiful, and the urine free, the intelligence remains unaffected, but the skin becomes cold and damp, the pulse small, and finally imperceptible at the wrist, and death ensues from gradual exhaustion and syncope. When the black vomit is scanty, and the urine is suppressed, the poisoned blood acts on the brain, and the patient exhibits wild delirium, followed by coma, convulsions, and death. The ratio of deaths to cases in the disease is always very high, and in poorly nourished persons and those given to alcoholic excess the chances of recovery are slight.

A person with yellow fever should be kept in bed and remain as quiet as possible. The bowels should be moved by a small dose of calomel, and care must be taken to see that the bladder is evacuated regularly. The best results in treatment are said to follow the use of bichloride of mercury 1-60 grain, and bicarbonate of sodium 7 grains, in ice water every hour or two. If the fever is high or the patient is very restless, cool sponging is useful. For the first two or three days it is better to give no food, only cool water being allowed by the mouth; and later milk, eggs or broths may be given by rectal injection. No solid food should be allowed for ten days or two weeks after the acute symptoms have subsided. To protect others the bed of the patient should be screened so that no mosquitoes can get at him, and the mosquitoes already in the room should be stupefied by burning insect powder, and then be swept up and burned.

We conclude with a short history of this disorder. Long before the arrival of Cortes in Mexico, an extremely fatal epidemic disease prevailed among the native Mexicans. Epidemics of special severity occurred

1545, 1576, 1736-7 and 1761-2. Although Humboldt thinks that the elevation of the table-land of Mexico (7,200 to 7,800 ft. above sea-level) is sufficient to exclude any idea of the identity of this disease, known as *Matlazahuatl*, with yellow fever, there can be little doubt, from the similarity of the symptoms, that the two are the same. The Europeans visiting the shores of America soon became painfully familiar with the disease; and it is almost certain that 'the plague' which so often destroyed the English and Spanish troops at the end of the 15th and the beginning of the 16th century was in reality yellow fever. A disease bearing the character of yellow fever appeared 1618 among the Indians in certain parts of Massachusetts, and prevailed with much severity till 1622; and it committed havoc among the British emigrants to Virginia. When the expedition against Hispaniola 1655, under Venables, returned to Jamaica, they met there 'an enemy (the plague) more severe than the Spaniards, which in a little time reduced the army, originally 7,000, to fewer than 2,000 men.' There can be little doubt that this plague was yellow fever. In 1691 it was very fatal in Barbadoes, where it was known as the *New Distemper*. From about this date, yellow fever has been endemic in the West Indies. It was unknown at Carthagena and along the coast till 1729, when it committed dreadful havoc; the Spanish galleons never remaining any length of time without interring one-half, or at least one-third, of their men. In 1740 it appeared at Guayaquil, since which time it has often occurred; and in all the towns on the coast of the American continent and islands between 45° n. lat. and 10° s. lat. it appeared in proportion as Europeans began to visit them. Vera Cruz and Havana were formerly regarded as the nursery of yellow fever, and from March to September or October the disease raged like a pestilence among the recently arrived Europeans and those natives who descended from the elevated table-lands of the interior. Since the discovery of the propagation of the disease through the agency of mosquitoes, and the institution of measures based upon that discovery, the disease in Havana has been entirely suppressed, and since 1900 there have been only a few spasmodic cases in that city. Until 1793 the disease was regarded as having a spontaneous origin, and as due to tropical peculiarities operating on European and unseasoned constitutions; but that year the doctrine of infection suddenly started. In that year the disease appeared with great virulence in the island of Grenada, and rapidly spread to Caracas in Venezuela, and over the Antilles to Carolina county, Md., Alexandria, Va., several counties in North Carolina, also to Philadelphia and many parts of Pennsylvania to New York, and even to a few places in Massachusetts. This outbreak was preceded by a few days by the arrival of a vessel from Bulam, on the w.

African coast, at a harbor in St. Granada, in which vessel, when stationed off Bulam, fever had been fatally prevalent about five months before. This disease was at the time termed the Bulam fever, but soon turned out to be ordinary yellow fever. Since 1763 yellow fever has very often appeared as an epidemic in the West Indian Islands and parts of the southern United States, and has been endemic even in various parts of s. Europe, especially Gibraltar and Malaga. In the last half-century it has had, with two or three exceptions, no prevalence in the Atlantic ports of the United States, but has passed to the Gulf ports and towns on the Mississippi river. The most terrible recent visitation of yellow fever scourged portions of the lower Mississippi valley in the autumn of 1878: in New Orleans and Memphis alone the deaths exceeded 5,000. From the testimony of many medical writers, it is certain that a disease essentially identical with yellow fever prevails endemically along the w. coast of Africa, at Senegal, Sierra Leone, Cape Coast Castle, and the island of Fernando Po.

YELLOW-HAMMER: originally, in Great Britain, the common yellow bunting (*Emberiza citrinella*), which is yellow above, varied by dark-brown patches, the under parts being pure yellow, and the wing-feathers dusky black, with brown or yellow edges. The flanks are of a brownish hue. The nest is placed on the ground, and is composed of grasses, moss, roots, etc., and lined with hair. These birds, when fat, in the autumn, are much in request for their flesh. These inoffensive birds are regarded with superstitious dislike in some districts, and their eggs are broken by boys whenever they are discovered, a foolish saying being current that each egg contains a drop of 'devil's blood.' In the United States the term is misapplied to the goldenwinged woodpecker or highhole.

YELLOW JACK: a quarantine flag displayed at naval hospitals and from vessels in times of epidemics. Also a common name for yellow fever.

YELLOW-JACKET: any species of small American wasp marked with black and yellow stripes.

YELLOW-LEGS, or YELLOW-SHANKS, or LESSER TELL-TALE (*Totanus flavipes*): bird of the Snipe family (*Scolopacidæ*). It is about 11 in. in length, the bill $1\frac{3}{4}$. In summer the color is ashy brown above, varied with black and white; below white; the throat streaked and the breast and sides dark speckled or barred (less or not at all in winter), and tail marbled or barred with white. It is a valued game-bird of the United States. The European Green-shanks, very similar, was found as a straggler in Fla. The Greater Tell-tale or Stone-snipe (*T. melanoleucus*) of N. America is hardly distinguishable from the Lesser, except in its larger size, $12\frac{1}{2}$ in. in length, and the bill $2\frac{1}{4}$. To the same genus belongs the Solitary

Tattler, 9 in. long, breast and legs dusky All these species are noisy; hence some of the names.

YELLOW-RATTLE: a scrophulariaceous plant, *Rhianthus crista galli*, an annual herb with opposite, lanceolate, sessile leaves, and terminal one-sided, leafy-bracted spikes of yellow flowers. The corollas are two-lipped, with an arched upper lip, and three-lobed lower one The capsule is orbicular and flat, with several round-winged seeds, which rattle about the pod when shaken, and have given rise to other descriptive names, such as rattle, rattle-box, penny-rattle, etc. In European fields it is very abundant and becomes a pest, since it is parasitic and attaches itself by suckers to the roots of living grasses.

YELLOW RIVER. See HWANG-HO.

YELLOW-ROOT: either one of two ranunculaceous plants, one being known as the shrub yellow-root (*Xanthorrhiza apiifolia*). Its long roots and rootstock, leaves, bark and pith, are bright yellow, and the root is extremely bitter and astringent, and is used as a tonic. This yellow-root grows in the southern United States and has pinnate leaves clustered at the top of a short stem, giving the plant a fern-like aspect. The foliage turns to gorgeous lines of scarlet and orange in the autumn. The five-merous flowers are wine-colored. The other yellow-root (*Hydrastis canadensis*) is known also as golden-seal, or yellow puccoon; its root is a tonic drug. The plant has abundant reniform, palmately-lobed, basal leaves, and two cauline ones, the uppermost of these subtending the solitary, greenish-white flower. The puccoon is found in woods in the eastern United States and furnished the Indians with a favorite yellow dye.

YEL'LOW SEA. See WHANG-HAI.

YEL'LOWSTONE LAKE: beautiful sheet of water in the Yellowstone National Park, in n.w. Wyoming; 22 m. long, 12 to 15 m. wide; of very irregular form, somewhat like an outstretched hand; about 150 sq.m. It is 7,738 ft. above sea-level; greatest depth 300 ft. On its banks are many hot springs. The Yellowstone river, about 25 m. from its source, flows into this lake at the s., and issues from its n. side. Among the mountains around the lake are Mt. Sheridan and Mt. Langford.

YEL'LOWSTONE: a river, the largest affluent of the Missouri, flowing out of the beautiful Yellowstone Lake, high up in the Rocky Mts., 7,738 ft. above sea-level. It flows n. through the Yellowstone National Park, forming two grand cataracts; then passes n. through a mountainous region in Montana, from which it emerges into the plains near the mouth of Shields river; thence flowing n.e. to the Missouri river, on the w. boundary of Dakota, 48° 5′ n. lat., 104° w. long. Its mouth is about 2,000 ft. above sea-level, and is 2,400 ft. wide. Its length is about 1,300 m., and steamboats navigate it at high water about 300 m. to the mouth of the Big Horn, its

largest affluent. The name is supposed to be from the steep bluff of yellow sandstone on the bank of the Yellowstone, above the mouth of the Big Horn river.

YEL'LOWSTONE NATIONAL PARK: district at the n.w. corner of Wyoming, bounded n. by Montana, w. by Idaho; about 62 m. long n. to s., about 54 m. wide e. to w.; nearly a rectangle in shape; 3,312 sq.m. It is mostly in Wyo., with small portions in Mont. and in Idaho. It is mostly an elevated plateau; its highest part 8,000 ft. above sea-level, lowest 6,000. This elevation gives it a very cold climate; snow lies on the ground nearly nine months in the year, and winter begins in Sep. The e. part is occupied by a rugged mountain chain, the Absaroka range, some peaks of which exceed 11,000 ft. in height. These mountains separate the waters of the Yellowstone and Big Horn rivers, and present scenery unsurpassed for sublimity in the United States. The Gallatin range, near the n.w. corner, has its highest point in Electric Peak, 11,155 ft., just within the boundary of the park. Near the middle of the park are the Washburn Mts. (highest, Mt. Washburn, 10,346 ft.); and the Red Mts. (10,385 ft.) are in the s. part. There are many beautiful lakes; and the streams are in part the headwaters of the Missouri and of the Columbia. Little was known of this wonderful district until 1864, when Capt. W. W. de Lacy and party penetrated its w. edge. Another expedition, 1870, under Gen. Washburn, surveyor-gen. of Montana, first made the wonders of this region fully known. In the two following years a thorough survey was made by the geological survey of the territories, with the result that 1872 congress earned the thanks of the civilized world by setting it apart as a 'public park or pleasuring-ground for the benefit and enjoyment of the people.' The chief attraction of the Yellowstone National Park is its extraordinary diversity of natural phenomena, such as is not brought together within the same area in any other part of the new or the old world. It is a land of streams and waterfalls, geysers and hot springs, diversified by mountains, hills, and dales, and lakes, and covered by a dense growth of coniferous timber. The Yellowstone River (q.v.), tributary of the Missouri, flows through this region: after leaving the Yellowstone Lake (q.v.) it passes for a few miles between high wooded banks; then its bed becomes broken by rocks, and in the Upper Fall shoots over a precipice 112 ft. high. Flowing on quietly for half a mile, it dashes over a ledge of trachyte 300 ft. high into the Grand Cañon, carrying at the average stage about 1,200 cubic ft of water per second. The water at the edge of this fall is very deep, and of dark green color, and flows down the gorge an 'emerald green stream, dashed with patches of white, beating with furious waves the rocky walls that prison it.' This Grand Cañon, down which the river flows, is a gorge with some scenic effects unequalled

on the globe; it is about 24 m. long, with depth of 600 to 1,200 ft. cut at a very steep angle in a volcanic plateau Its rugged broken walls present an amazing richness of diverse colors. Other streams, tributaries of the Yellowstone, have fine cataracts. Here and there at the foot and on the sides of the cañon walls are sulphur springs. Hot springs of all sizes are everywhere abundant in the park, of all temperatures from tepid to boiling: they number not less than 3,000. There are also 71 geysers, some throwing columns of boiling water to the height of 200 ft. The waters of the White Mountain or Mammoth Springs are highly charged with calcareous matter, which, being deposited around, has formed a hill 200 ft. high of dazzling white, its sides striped with bands of red and yellow. Around this hill are semicircular basins, from a few inches to 6 or 8 ft. in diameter, and from 2 in. to 2 ft. in depth. At the top of the hill, where are the active springs, is a broad flat terrace covered with these basins, which are 450 to 600 ft. in diameter. Calcareous deposits of past springs abound in the neighborhood as a witness of former activity; the most notable being 'Liberty Cap,' a cone 50 ft. in height, and about 20 ft. diameter at base. The largest collections of springs and geysers are in two valleys at the head of the Madison river, where it is known as the Firehole. The upper valley, 12 sq.m. in extent, contains 26 geysers, irregular and periodic, throwing water to a considerable height; while the floor of the valley is covered with hard, white, glistening crust of silica. These geysers bear such names as Old Faithful, Beehive, Giantess, etc., and throw water 25 to 180 ft. The geyser basin in the Lower valley, 20 sq.m. in extent, is more noticeable for its quiet hot springs. Of its 16 geysers, the finest is that known as the Architectural. There is another collection of 10 geysers at Shoshone Lake, the finest of which is the Union. There are innumerable little lakelets scattered about amid the primeval forest: the most notable of the lakes, and the largest, is the Yellowstone, with the Shoshone, Lewis, and Heart lakes. Of minerals, obsidian and quartz are plentifully found here, also silicified wood. The Yellowstone National Park offers hotel accommodation for the traveller, and roads have been made to the chief objects of interest. It is accessible by the Northern Pacific railroad, of which a branch extends up the valley of the Yellowstone to within a few m. of the n. boundary of the park—connecting with stage-coaches beyond.

The reservation of the Yellowstone region for a national park has already produced beneficial results in saving from extermination some species of 'game' animals formerly abundant on the w. plains and in the Rocky Mts. A visitor to the park 1891 writes that he saw on Specimen Ridge, at an elevation of 8,000 ft., 300 antelopes, and that 'several large herds' of these animals can be seen in the Blacktail country. Elk, too, are seen

in small and large bands: the traveller saw one band that numbered at least 400. That the management of the park is efficient is shown by the sense of security possessed by the animals—e.g., the band of 400 elk showed no alarm, though the traveller, with his horse and dog, was in plain view for an hour. There is a small band of buffalo in the Hayden valley.

YEL'LOW-THROAT, or MARYLAND YELLOW-THROAT (*Geothylpis trichas*): bird of the same genus with the Kentucky, the Connecticut, the Mourning, and the far-western Macgillivray's warblers, formerly included with our other warblers in the family *Sylvicolidæ,* but now separated as the *Mniotiltidæ* of North America. It ranges from Central America and the West Indies through the entire United States, replaced w. by a larger variety, *Occidentalis,* with the belly clear yellow; and it remains through the summer, a common and pretty bird in thickets, with a lively song. It is 4½ to 5 in. in length, olive green, the forehead and a band through the eye to the neck jet black; the under parts, from the bill, rich yellow, changing to whitish or buffish on the belly; the female and young without the black, and the colors less bright. The Yellow-throated Warbler (*Dendroica dominica*), rare north, is ashy blue above; and the Yellow-throated Vireo (*Vireo flavifrons*), though olive green above, lacks the black mask, and has a yellow ring around the eye.

YELP, v. *yĕlp* [AS. *gilpan, gielpan,* to boast: Icel. *gjálfr,* yelping of dogs, dashing of waves]: to utter a sharp or shrill bark, as a dog: N. a sharp, shrill bark. YELP'ING, imp.: ADJ. barking: N. the continuous shrill barking of a dog. YELPED, pp. *yĕlpt.*

YEMEN, *yĕm'ĕn:* in a wide sense, the whole s. and s.w. of Arabia; but, more strictly, only the s.w. corner of the peninsula; bounded n. by Hedjaz and Nedjed, e. by Hadramaut and the Desert. It was known to the ancients as *Arabia Felix* (*Felix* being a mistranslation on the part of Ptolemy of *Yemen,* which does not mean 'happy,' but the land to the 'right' of Mecca); and they obtained from it much frankincense, myrrh, and other costly balsamic substances, in which it abounds more than any other part of the world; they obtained from its ports also the products of India, and other Eastern regions, with which its inhabitants maintained constant trade. The history of Yemen reaches back to the highest antiquity. The Joktanides, descendants of Joktan or Kahtan, are its first possessors of whom we have record; and from them it seems to have passed, about B.C. 2400, into the hands of the Himyarites, or Homerites. The Himyarite states and cities of Saba, Thaphar, and Athana or Aden, attained at an early period a high prosperity, carrying on a great commerce by sea and land; and they extended their dominion over a large part of

Asia and n.w. Africa: see ADEN. The persecution of the Christians by the last Himyarite princes led to overthrow of the Himyarite power by the Abyssinians A.D. 529. From this date till 601 Yemen was ruled by Abyssinian governors; then for a short time by the Persians, under Khosru (*Chosroes*) II. The followers of Mohammed did not succeed in subduing Yemen till they had for a considerable time been masters of the rest of Arabia. Under all the caliphs, and even under Saladin, Himyarite princes retained a partial independence, which they reacquired when the Turks, who conquered the country in the 16th c., were expelled in the century following. For more than two centuries afterward, the country remained under the dominion of a number of Himyarite princes or sheiks, the most powerful of them being for a time the Imám of Sanaa (q.v.). In 1871-73 it was reconquered by Turkey.

The people of Yemen differ considerably in physical characteristics, dress, and manners from the inhabitants of other parts of Arabia, and their language gives evidence of a different origin. See SABEANS (dwellers in Yemen): HIMYARIC.

Our geographical knowledge of Yemen has been much increased by recent explorations, and charts of its coasts have been laid down by officers in the service of the East India Company. Through the whole length of the country, 10 to 30 m. from the coast, a chain of mountains extends, between which and the sea is a tract of low ground, the *Tehama*, generally sandy and desolate, but in some places very fertile, and clothed with tropical vegetation. Inland from the mountain chain is a fertile table-land, at a general elevation of about 4,000 ft., yielding the productions of warm temperature rather than of tropical regions. Some of the mountains rise to about 8,000 ft. The slopes even of the more lofty mountains are covered with luxuriant forests, and the mountain valleys are of unsurpassed fertility. The principal exports are coffee, dates, senna, gums and gum resins, wax, ivory, and goat-skin morocco: some grain also is exported. There are no rivers; but some good harbors are formed by natural openings in the coral reefs which line the coast. The principal ports are Mocha (q.v.), famous for the coffee which it exports; Aboo Arish, or Gasim; Hodeida; Shehr; and Aden (q.v.), now in the hands of the British. Sanaa, the capital, or nominal capital, is on the table-land. Damar, Taas, Loheia, Beit-el-Kakih, and Zebeed are among the principal towns.

YEN, n. *yĕn* [Jap.—from Chinese *yuen*, round, a round thing, hence a dollar]: a dollar; the monetary unit of Japan since 1871. It is represented by both gold and silver coins. The gold yen weighs 1.666 grams, is .900 fine, and about equal in value to the gold dollar of the United States. The silver yen weighs 26.956 grams (416

grains), is .900 fine, and equal in value to the silver dollar of the United States. The yen is divided into cents or hundredths, called *sen* (represented by a bronze coin), and mills, called *rin* (represented by the old copper cash of the country). The fractional silver currency consists of 5, 10, 20, and 50 sen pieces (all of which also are represented by paper). Inconvertible notes of 1, 2, 10, 20 yen, and larger denominations, also are in circulation.

YENIKALE STRAIT, *yĕn-ē-kâ'lā;* sometimes called STRAIT OF KERTCH: connecting the Sea of Azov with the Black Sea, forming a sea-passage between the Crimea on the w. and the Caucasus on the e.; more than 20 m. long, and at its narrowest less than 2 m. wide. It is shallow and interrupted by shoals, so that cautious sailing and steering are necessary even for small steamers.

YENISEI, *yĕn-ē-sā'ē:* one of the largest rivers of Siberia, formed by the junction of the Oulou-Keme and the Bey-Keme, which rise in the mountains on the s. border of Siberia. It flows n. through central Siberia into the Arctic Ocean, forming at its mouth a long estuary. In its upper course it is interrupted by falls and rapids; but afterward flows through a great plain or steppe, receiving many tributaries, of which the principal are the Upper Tunguska or Angara, from Lake Baikal; the Middle and the Lower Tunkuska. The Yenisei is 3,400 m. long, and is traversed by steamers. Repeated voyages since 1875 have proved that it is possible during part of the summer for vessels from Europe to sail direct to the mouth of the Yenisei, and to carry back the varied produce of its immense basin.

YENISEISK, Siberia: (1) a town in the government of the same name on the left bank of the Yenisei, 200 m. n. of Krasnoiarsk. It has several churches, a monastery, museum of natural history and archæology, and a public library. It is in the northern gold-mining region, has a custom-house, an extensive trade, particularly in furs, and an annual fair. Pop. (1897) 11,739. (2) A province in the government of Irkutsk, bordering on the Arctic Ocean, bounded e. by Yakutsk and Irkutsk, s. by Mongolia, and w. by Tomsk; area, 987,186 sq.m.; capital, Krasnoiarsk. The s. part of the province is occupied with the Altai Hills and their offsets. In the Yenisei valley considerable tracts are under tillage, but north of the town of Yeniseisk this is succeeded first by pasturage, then by stretches ever more and more desolate, to the frozen tundras. The chief river is the Yenisei. Smaller streams are the Taimyr, Katanga, and Anabar, which, like the Yenisei, form great gulfs at their mouths. The gold washings of Yeniseisk occupy 12,000 to 15,000 men and several thousand horses. Of the native tribes, who live by hunting, fishing, and trade in fur, the chief are Samoyedes and Tungus. Pop. 559,902.

YENITE, n. *yē'nīt* [named after the German town of

Jena]: a mineral of a black or brownish-black color and sub-metallic lustre, consisting of a double silicate of lime and iron, first obtained at Elba.

YEO, Sir James Lucas: English naval officer: b. Southampton, Hampshire, 1782; d. at sea 1818. Entering the navy at 11 he was present at the siege of Genoa in 1800, and while in command of a force of English and Portuguese captured Cayenne, French Guiana. In 1813 he became commander-in-chief of the English naval force of the Great Lakes and soon came into conflict with the American ships of war there. After several indecisive engagements he captured Oswego, 1814, May 6, which the Americans soon retook, and afterward blockaded Commodore Chauncey at Sackett's Harbor. In the following year Yeo was made commander-in-chief of the English fleet on the w. coast of Africa.

YEOMAN: a term of early English origin formerly applied to a feudal attendant or servant, but in the 15th century and subsequently denoting a small freeholder below the rank of gentleman. The term yeoman was given also to the 40 shillings freeholder, and commonly to any small farmer or countryman above the grade of laborer. The term is also familiar in the titles of functionaries in royal households, such as yeoman usher of the black rod, yeoman of the robes, etc.

YEOMANRY: a force of volunteer cavalry first enrolled in Great Britain during the wars of the French Revolution, and consisting to a great extent of country gentlemen and farmers possessing their own horses and requisite equipment. They are liable to be called out in aid of the civil power in case of riot at any time; in case of actual invasion, or the appearance of an enemy on the coast or during a rebellion, they may be assembled for actual service; they are then subject to the Mutiny Act and Articles of War, and may be called upon to serve in any part of Great Britain. During permanent service they receive cavalry pay and an allowance for forage. They undergo six days' training, and must attend a certain number of drills yearly, for which they receive 7s a day as subsistence allowance, and 2s for forage. Arms and ammunition are provided by the War Office, and there is an annual allowance of £2, or about $9.74, per man; but each man has to provide his own horse, which is exempt from taxation. For their services during the Boer war, 1899-1902, they received the title of Imperial Yeomanry. Colonial Yeomanry have been enlisted for the defense of the British colonies.

YEOMEN OF AMERICA: fraternal order founded 1898. In 1908 it had 1 national and 366 subordinate councils, with 15,587 members. Its disbursements for benefits since organization were $348,391.

YEOMEN OF THE GUARD: in England, a corps of

veteran soldiers of stately presence, employed on state occasions in conjunction with the gentlemen-at-arms as the bodyguard of the sovereign. The yeomen were constituted a corps in 1485 by King Henry VII., and they still wear the costumes of that period. The officers of the corps are a captain, ordinarily a peer, a lieutenant, and an ensign—all old army officers. There are also a 'Clerk of the Cheque' and four 'Exons,' besides non-commissioned officers (messengers, sergeant-majors, yeoman bidgoirs, yeoman bedhangers), and 100 privates. The Beef-Eaters or Warders of the Tower, are, contrary to common belief, an entirely different corps, but since the reign of Edward VI. have been privileged to wear the yeoman's uniform, without the shoulder belt.

YEOVIL, *yō'vĭl:* a small municipal borough of Somersetshire, England; 40 m. s. of Bristol, 124 m. w.s.w. of London; on the borders of Dorsetshire. It is a busy, handsome place, built of red brick and yellow Hamhill (a neighboring quarry) stone, and situated in a pleasing district on a hillside sloping to the Yeo. The Church of St. John is a large and beautiful cruciform structure of the 15th c., in Perpendicular style: height of the side aisles, and large size of the windows, give it grace and lightness; hence it has been called the 'Lantern of the West.' There are several other churches, besides schools, almshouses, and other charities. Kid and other gloves are here more extensively manufactured than in any other town in England: there are about 20 manufactories, producing about 10,000 dozen pairs of gloves per week. The women, who sew the gloves, work at home. Woolen manufactures and leather-dressing also are carried on. Pop. (1871) 8,527; (1881) 8,480; (1891) 9,648; (1901) 9,861.

YERBA, n. *yėr'ba* [Sp. *yerba*—from L. *herba,* a herb]: *maté* or Paraguay Tea.

YERCUM, *yėr'kŭm:* an East Indian name of the plants called Mudar, and their fibre.

YERGAS, n. *yĕr'gas* [etym. doubtful]: a coarse woolen fabric for horse-cloths.

YERK, v. *yėrk* [another spelling of JERK, which see]: to throw out or move with a spring; to lash; to strike; in *Scot.,* to bind tightly: N. a sudden or quick thrust or motion. YERK'ING, imp. YERKED, pp. *yėrkt.*

YERKES, CHARLES TYSON: American capitalist: b. Philadelphia, Pa., 1837, June 25; d. New York City, 1905, Dec. 29. He received a secondary education in Philadelphia, was for a time in the flour and grain business, in 1859 became a stock-broker, and in 1861-86 was in banking, first in Philadelphia, and from 1881 in Chicago. In 1871 he was obliged to make an assignment, but by fortunate investments he soon financially re-established himself, and became prominently connected with the Philadelphia street-railway system. After his removal to

Chicago he acquired a controlling position in its street-railway system. In 1892-3 he was a prominent member of the board of directors of the World's Columbian Exposition at Chicago, rendering particular service to the department of fine arts, to whose exhibit he loaned his fine collection of paintings. Among his later enterprises was that connected with the London system of underground railways. He gave to the University of Chicago funds for the buildings and instruments of the Yerkes Observatory, with its famous telescope. This was described by Newcomb as 'one of the most munificent gifts ever made for the promotion of any single science. In his will he bequeathed to the city of New York his home on Fifth avenue, with its art collection, for a museum.

YERKES OBSERVATORY: astronomical observatory of the University of Chicago, located on Lake Geneva, near William Bay, Wis. It was founded in 1892 by Charles Tyson Yerkes, who presented to the university funds sufficient for its building and equipment. It has a refracting telescope with an aperture of 40 inches, the largest in the world. The observatory is used chiefly for advanced work in astronomy, for which its equipment offers exceptional facilities.

YES, ad. *yĕs* [AS. *gese;* Ger. *ja;* yes (see also YEA)]: a word expressing affirmation or consent; even so.

YESTER, a. *yĕs'tėr* [AS. *geostra,* yester: Dut. *gisteren;* Goth. *gistra-dagis;* Ger. *gestern,* yesterday: L. *hesternus,* of yesterday: Icel. *gær;* L. *heri,* yesterday]: next before the present day; last—rarely, if ever, used except in compounds. YES'TERDAY, n. *-dā* [AS. *geostrandæg,* yesterday]: the day last past; the day immediately preceding the present one: AD. on the day before to-day. YES'TEREVE, n. *-ēv,* the evening last past. YES'TERNIGHT, n. *-nīt,* the night last past: AD. on the night last past. YESTREEN, n. *yĕs-trēn',* in *Scot.,* last night; yesterday evening.

YET, ad. *yĕt* [AS. *gyt;* Fris. *ieta, eta,* yet, still: Gr. *eti,* yet]: beside; still; once again; at this time; even; after all; hitherto; thus far; up to the present: usually with a *negative:* CONJ. nevertheless; notwithstanding; however.

YEW, n. *yô* [AS. *iw;* Ger. *eibe;* W. *yw;* Dut. *ijf,* the yew]: a large evergreen tree of the genus *Taxus* and nat. order *Taxaceæ,* which is very generally regarded as a sub-order of *Coniferæ,* and is characterized by solitary and terminal fertile flowers, with solitary ovule sessile in the centre of a fleshy disk, forming a sort of drupe or berry when in fruit, and by dicotyledonous seeds. The genus *Taxus* is distinguished by a solitary terminal seed, surrounded by a succulent cup. The species are diffused over n. parts of the world, and are large and beautiful evergreen trees, with narrow lanceolate or linear leaves.

The COMMON YEW (*T. baccata*), a tree of 30-40 ft. with a trunk sometimes of great thickness, branching a few ft. above the ground, and forming a large and dense head, is a native of middle and s. Europe and of Siberia. Noble specimens of it are seen in many parts of Great Britain. It attains a great age, at least 300 or 400 years. Its wood has been much used from very early times for making bows, for which it is preferred to every other kind of wood. It is very hard, and reckoned almost equal to boxwood for fine work. The heart-wood is of orange-red or deep-brown color. The fruit is red, and was long reputed poisonous, but the pulpy part is not so; the seed, however, is injurious. The leaves also are a powerful narcotic; and though they are sometimes given as a vermifuge, their use is attended with danger.—The IRISH YEW (*T. fastigiata* of Lindley, *T. Hibernica* of Hooker), originally discovered in Ireland, and now very common in pleasure-grounds, is by many supposed to be a mere variety of the common species, with upright fastigiate habit; but it differs also in having the leaves scattered, while those of the Common Yew are in two rows.—The NORTH AMERICAN YEW (*T. Canadensis*) is of humbler growth. It is known as Ground Hemlock.

YEX, v. *yĕks* [AS. *giscian*, to sob]: in *old* and *prov. Eng.*, to hiccough: N. a hiccough.

YEZD. See YAZD.

YEZIDI, or YEZIDEE, n. plu. *yĕz'ĭ-dē* [Persian]: in *comp. religion*, peculiar Kurdish tribe inhabiting the Binjar range in Mesopotamia and adjacent regions, and constituting a sect of religionists who, while admitting that God is supreme, believe the devil to be a mighty angel, who will yet be restored to heaven, and who is deserving of worship. They were probably originally Zoroastrians, whose faith became partly modified by the Christians and Mohammedans with whom they came in contact. They believe in the Old Test., and profess respect also for the New Test. and the Koran.

YEZO, or *yĕz'ō*, YESSO, or JESSO, *yĕs'sō:* most northerly of the four principal islands which compose the empire of Japan; about 300 m. in extreme length, a little more than 200 m. in extreme width; about 35,000 sq.m. In recent years Yezo has been thoroughly explored, and extensive measures have been taken to colonize the island and develop its natural resources. The population is chiefly in the s.; the hairy Ainos thinly occupy the n. The Ainos, a distinct race from the Japanese, are stupid and good-natured; they are of broader and heavier make, and have a heavy growth of thick black hair, the chest and limbs being frequently overgrown. (See Miss Bird's *Unbeaten Tracks in Japan*, 1880.) Yezo is mountainous, with volcanoes; it is rich in fine timber and in valuable minerals, especially coal; the rivers and coasts abound in fish. Bears, wolves, and deer are found. The

chief towns are Matsumai, Hakodadi, and Sapporo. Pop. of Yezo (1904) 843,717.

YGGDRASILL, or YGDRASIL: in Scandinavian mythology, the giant ash tree overspreading the whole world and reaching above the heavens. It binds together, earth, heaven, and hell, and its roots stretch out to the Asa or Æsir gods in heaven, to the front giants, and to the under world. A marvellous fountain springs up under each of these three great roots and in the tree, whose boughs drip continually with honey, dwell an eagle and the squirrel Ratatöskr. At its roots the serpent Nithöggr gnaws, and between the serpent and the eagle runs the squirrel constantly endeavoring to provoke the two to strife. Certain writers detect in this myth a distortion of the story of the Cross, but the translator of Grimm says, 'it were a far likelier theory, that floating heathen traditions of the world tree, soon after the conversion in Germany, France, or England, attached themselves to an object of Christian faith just as heathen temples and holy places were converted into Christian ones.'

YID, n. *yĭd* [from G. *jüdisch*, Jewish, from *Jude*, Jew, from L. *Judæus*]: slang term meaning a Jew. YIDDISH, a. idiomatic language or jargon spoken by an illiterate class of Jews.

YIELD, v. *yēld* [AS. *gieldan*, *gildan*, to restore, to repay: Sw. *gälla*, to be worth: Icel. *gjalda*, to pay: Goth. *gildan*, to requite]: to give or render back; to repay; to recompense, to give in return; to bring forth; to produce; to afford; to concede; to admit to be true; to submit; to give way; to give place; to surrender: N. the amount produced; the return for labor or money expended. YIELD'ING, imp.: ADJ. inclined to give way or comply; unresisting; flexible: N. act of producing or paying back; act of surrendering. YIELD'ED, pp. YIELD'INGLY, ad. *-lĭ*. YIELD'INGNESS, n. *-nĕs*, the quality of yielding. YIELD'ER, n. *-ėr*, one who or that which yields. TO YIELD UP THE GHOST, to expire.—SYN. of 'yield, v.': to afford; exhibit; allow; permit; admit; grant; emit; resign; give up; accede; assent; acquiesce; consent; accord; agree; comply; conform; cede.

YING-TSZE, *yĭng-tzē'* (commonly called NEWCHWANG, NIU-CHWANG, or NEUCHWANG): seaport of China; on the river Liao, 13 m. from its mouth; on n. shore of Gulf of Liao-tûng; prov. of Shing-king, s. of Manchuria. Ying-Tsze is the port of New-chwang, a commercially unimportant town 80 m. further up the river (29 m. by land), designated in the treaty of Tientsin, 1858, as a port to be opened to foreign trade. Owing, however, to its unsuitability for foreign trade on account of the rapid silting up of the river as well as its winding course, the town of Ying-Tsze, 'the camp' or 'military station' (officially known as *Muh-kow Ying*), was chosen as the site of the foreign settlement, 1861, and to this the name

New-chwang is usually applied. Ying-Tsze is on low-lying land surrounded by mud-flats and reed-marshes, on the left bank of the river, and consists of one long muddy street running e. and w., parallel with the river, and several shorter streets at right angles to it. The foreign settlement occupies a strip of land on the river-bank immediately above the native town. Foreign pop. (including the customs establishment, consular families, and missionaries) about 50. Newchwang (Ying-tsze) exports millet, beans, bean-cake, oil, ginseng, silk, indigo, skins, etc., of annual value about $7,000,000; imports, cotton, woolen, and silk goods, sugar, paper, metals, opium, etc., of annual value about $3,000,000. There is a bar across the mouth of the river. The shipping trade is mostly coastwise, and stops entirely about 5 months (Nov. to Apr.) every year on account of the ice.—Pop. about 60,000.

YIN, *yēn*, YANG, *yâng* (called in Japanese In, *ēn*, Yo, *yō*): in Chinese cosmogony, the two primal forces of nature by the interaction of which all things have been evolved. *Yin* means and represents 'shade,' *Yang*, light; *Yin* is the negative, *Yang* the positive; *Yin* the female, *Yang* the male.

Y'LANG-Y'LANG, or Ihlang-Ihlang, *ē-lâng-ē-lâng'*: an anonaceous tree, *Cananga* (*Unona*) *odorata*, native in Java and the Philippine Islands, with long drooping flowers, from which is derived the rich and agreeable perfume called by the same name.

YLANG-YLANG, Attar of: a perfume fully as exquisite and as precious as the much-praised attar of roses. The ylang-ylang tree attains a height of 60 ft. and has drooping, greenish-yellow flowers 3 in. long and extraordinarily fragrant. The tree is common in the Philippines. It is found chiefly in the well-populated provinces and islands, and the natives say that it thrives best near the habitations of man. The propagation in plantations, by seed or cuttings, about 20 ft. apart each way (108 trees to the acre), is easy, and the growth rapid in almost any soil. The first flowers appear in the third year, the eight yielding as high as 100 pounds, the bloom occurring every month. The greatest yield is from July to December. The process of converting the long, greenish yellow, fragrant petals of the flower into essence is by the simplest form of distillation, using merely water and the choicest flowers. No chemicals of any kind are required.

Y-LEVEL, n. *wī' lĕv'ĕl* [Eng. *y*, from the shape of the supports, and *level*]: in *survey.*, an instrument for measuring both distance and altitude.

YMIR: in Scandinavian mythology, the personification of Chaos, or the first created being, produced by the antagonism of heat and cold in Ginnungagap, the primeval abyss. Slain by Odin and thrown into Ginnunga-

gap, his flesh was transformed into land, his bones becoming the mountains, his blood the rivers and lakes, his hair the forests, while his skull constituted the heavens, and his brains the clouds.

Y-MOTH, *wī'mŏth* (*Plusia gamma*): beautiful species of Moth, common throughout great part of Europe; about an inch in entire length, without reckoning the antennæ, which are not quite half an inch. The color is lilac, variegated with brown, the upper wings beautifully marbled, with a shining mark nearly in the form of the letter Y, or of the Greek γ (Gamma), whence the names. The lower wings are dirty white, with a broad smoky border, and a white fringe, spotted with black. This moth flies about during the day in summer and autumn. It is very swift of flight. It lays its eggs on the under side of leaves. The caterpillar is slightly hairy, green with a yellow line along each side, and five white ones down the back. It feeds on the leaves of a great variety of plants, as peas, beans, turnips, cabbages, hemp, clover, oats, and other grasses. It sometimes ravages gardens.

YODE, v. *yōd* [AS. *eoðe*]: OE. for *went*.

YODEL, or YODLE, v. *yō'dl* [Ger. Swiss]: to sing or utter a sound, peculiar to the Swiss and Tyrolese mountaineers, by suddenly changing from the natural voice to the falsetto: N. a sound or tune peculiar to the Swiss and Tyrolese mountaineers.

YODER, *yō'dėr*, JACOB: pioneer: 1758, Aug. 11—1832, Apr. 7; b. Reading, Pa.; of Swiss descent. He was the first person to navigate the Ohio and Mississippi rivers for commercial purposes. At the close of the revolution, in which he served throughout, he built a boat at Fort Red Stone (now Brownsville), on the Monongahela river, loaded it with flour, and 1782, May, took it by these rivers to New Orleans, and sold it. With the profits of this enterprise he purchased peltries, which he carried to Havana, and with the proceeds of their sale bought sugar, which he sold in Philadelphia. He afterward removed to Spencer co., Ky., where he was active in helping to equip and keep in the field troops for the Northwest Territory. He died in Spencer county.

YODER, ROBERT ANDERSON, D.D.: American Lutheran clergyman and educator: b. Lincoln co., N. C., 1853, Aug. 16. Graduated from North Carolina College in 1877, he was ordained to the ministry of the Lutheran Church in 1879, and, after study at the seminary of the Church in Philadelphia, held pastorates in North Carolina. From 1888 to 1891 he was president of Concordia College (Fort Wayne, Ind.), and in 1891 became president of Lenoir College (Hickory, N. C.). He was chosen pastor of St. James Church at Newton, N. C., and in 1902 was president of the United Synod of the South at Charleston.

YOGA, *yō'ga* [from Skr. *yuj*, join: kindred to the L. *jung-*, Gr. *zeug-*, Gothic, *jiuk;* hence *junction*, and, figuratively, 'concentration, religious or abstract contemplation']: one of the two divisions of the Sânkhya philosophy of the Hindus: see SÂNKHYA. While the first of these divisions, the Sânkhya proper, is concerned chiefly in teaching the *tattwas*, or principles of creation, and the successive development of the latter, the main object of the Yoga is to establish the doctrine of a Supreme Being, and to teach the means by which the human soul may become permanently united with it; and since the Sânkhya proper is silent on the creation of the world by a Supreme Being—whence it was charged, though unjustly, by its opponents, with being atheistical—the Yoga, which is called theistical, is considered its complement. According to *Patanjali*, reputed author of this system, the term *Yoga* means 'the hindering of the modifications of thinking;' and by such modifications, which, he says, may be accompanied with afflictions or be free from them, he understands 'the three kinds of evidence—viz., perception, inference, and testimony—misconception or incorrect ascertainment, fancy, sleep, and recollection.' The 'hindering of these modifications' is, according to him, effected either by a repeated effort to keep the mind in its unmodified state, or by dispassion, which is the consciousness of having overcome all desires for objects that are seen (on earth) or are heard of (in Scripture).' Dispassion is conducive to meditation; this, again, is of different kinds, and is attained either 'impetuously'—in adopting various transcendent methods—or 'by a devoted reliance on *Is'wara*, the Lord.' This Lord, or Supreme Being, Patanjali then defines as 'a particular *Purusha*, or spirit, who is untouched by afflictions, works, the result of works, or deserts; in whom the germ of omniscience reaches its extreme limit; who is the preceptor of even the first, because he is not limited by time; and whose appellation is Om, the term of glory.' This word is to be muttered, and its sense is to be reflected on, for from it come the knowledge of *Is'wara* and the prevention of 'the obstacles' which impede Yoga. These obstacles, Patanjali says, are 'illness, apathy, doubt, listlessness about the accomplishment of meditation, want of exertion, attachment to worldly objects, erroneous perception, failure to attain any stage of meditation, or inability to continue in the state of meditation when it has been reached.' There are several other methods to prevent these obstacles from distracting the mind and impeding its steadiness. One, e.g., consists in pondering over one single accepted truth; another in 'practicing benevolence, tenderness, complacency, and disregard toward all objects in possession of happiness or grief, virtue or vice; another,' 'in forcibly expelling or retaining the breath;' another, in 'dwelling on knowledge that presents itself in dream or sleep;' etc. When all these modifications have disappeared, the mind becomes free from 'the tingeing' of the exterior world, as the pure crystal is free from the color that seems to belong to it, when a colored substance is seen athwart it. After having described

the various modes in which the mind may appear changed into the likeness of what it ponders, the author of this system then proceeds to explain the practical Yoga, by which 'concentration' may be attained. It comprises, according to him, mortification, the muttering of certain hymns, and a devoted reliance on the Lord. Through it, meditation is established, and *afflictions* are got rid of. By afflictions, again, he understands ignorance, egotism, affection, aversion, and tenacity of life; which terms are then the subject of an especial investigation into the nature of what is to be got rid of, of what is not desired to be got rid of, of what is constituted by the cause, and of what is the constitutive cause.—There are eight means or stages subservient to the attainment of concentration—viz., forbearance (*yama*), religious observance (*niyama*), postures (*âsana*), regulation of the breath (*prân'âyâma*), restraint of the senses (*pratyâhâra*), steadying of the mind (*dhâran'â*), contemplation (*dhyâna*), and profound meditation (*samâdhi*).—The first stage, *forbearance* (*yama*), consists in not doing injury to living beings, veracity, avoidance of theft, chastity, and non-acceptance of gifts; they are the universal great duty.—The second stage, *religious observance* (*niyama*), comprises purity—external as well as internal—contentment, austerity, muttering of the Vedic hymns, and devoted reliance on the Lord.—The third stage of Yoga, *postures* (*âsana*), is defined by Patanjali as 'that which is steady and comfortable' at the same time. The commentators mention several varieties of such postures. According to an interesting treatise on the Yoga philosophy by Navînachandrapâla, one of these, called *Siddhâsana*, is practiced by placing the left heel under the anus, and the right heel in front of the genitals, by fixing the sight upon the space between the eyebrows, and, while in this motionless attitude, meditating upon the mysterious syllable *Om* (q.v.). Of the posture called *Padmâsana* the same treatise says that it consists in placing the left foot upon the right thigh, and the right foot upon the left thigh, in holding with the right hand the right great toe, and with the left hand the left great toe, the hands coming from behind the back and crossing each other; while the chin rests on the interclavicular space, and the sight is fixed on the tip of the nose. When the command of such postures is attained, Patanjali says, the Yogin does not suffer either from cold or heat, hunger or thirst, or similar afflictions.—The fourth stage, *regulation of the breath* (*prân'âyâma*), is threefold, according as it concerns exhalation or inhalation, or becomes tantamount to suspension of the breath, the latter also being termed *kumbhaka* [from *kumbha*, a jar], because 'the vital spirits then are as motionless as water is in a jar.' Through such a regulation of the breath, the obscuration of the pure quality of the mind is removed, and the latter becomes fit for acts of attention. Navînachandrapâla describes different processes of the Prân'âyâma, as selected from different authorities. One, for instance, consists, according to him, in the act of inhaling through the left nostril for 7·6788 seconds, suspending the breath for 30·7152

seconds, and exhaling through the right nostril for 15·3576 seconds; then inhaling through the right nostril for 30·7152 seconds, exhaling through the right nostril for 7·6788 seconds, suspending the breath for 30·7152 seconds, and exhaling through the left nostril for 15·3576 seconds; lastly, inhaling through the left nostril for 7·6788 seconds, suspending the breath for 30·7152 seconds, and exhaling through the right nostril for 15·3576 seconds. To the *kumbhaka*, of which there are eight varieties, the same author observes, two processes are indispensable: sitting in one of the postures described; and, by means of an incision in the frænum linguæ, and milking, as it were, the tongue, causing it gradually to become so lengthened as to allow the rima glottidis to be shut by pressing back the epiglottis with the point of the retroverted tongue. Such *kumbhakas*, it is supposed, produce the most wonderful effects: some of them cure diseases of the head and lungs, dropsy, etc.; others make proof against all sorts of inflammation and fever; the eighth or last variety of the *kumbhaka*, especially, cures all diseases, purges from all sins, promotes longevity, enlightens the mind, and awakens the soul.—The fifth stage of Yoga, the *restraint of the senses* (*pratyâhâra*), means the withholding of the senses from their respective objects, and the accommodating them entirely to the nature of the mind. According to an authority quoted by Navînachandrapâla, a Yogin's senses are suspended when he can suspend the respiratory movements for 10 minutes and 48 seconds.—This stage is preparatory to the sixth, or *the steadying of the mind* (*dhâran'â*), which means the freeing of the mind from any sensual disturbance, by fixing the thoughts on some part of the body—for instance, on the navel or the tip of the nose. This stage, it is supposed, can be accomplished when the Yogin is able to suspend his respiratory movements for 21 minutes and 36 seconds; and, according to Navînachandrapâla, it is effected by different processes—muttering the syllable *Om* 144,000 times, fixing the eyes upon the tip of the nose, or the space between the eyebrows, for two hours, swallowing the tongue for two hours, etc.—*Contemplation* (*dhyâna*), the seventh stage of Yoga, is the fixing of the mind on the one object of knowledge, the Supreme Spirit, so as to exclude all other thoughts. It is practiced in consequence of the 'steadying of the mind,' as defined before; and, according to the authority quoted by Navînachandrapâla, a man can accomplish it when he is able to suspend his respiratory movements for 43 minutes and 12 seconds.—The eighth and last stage of Yoga, *profound meditation* (*samâdhi*), is the perfect absorption of thought into the one object of meditation, the Supreme Spirit; it is devoid, as it were, of any definite character which would suggest a term as applicable to it. In such a state, Navînachandrapâla says, 'a Yogin is insensible to heat and cold, to pleasure and pain; he is insensible to blows and wounds, to the effects of fire; he is the same in prosperity and adversity; he enjoys an ecstatic condition. He is free from lust, fear, and anger; he is disengaged

from all works. He is not affected by honor and dishonor. He looks on gold, iron, and stones with the same unconcerned eyes. He is the same in love and in hatred; he is the same among friends and enemies.' And according to the authority which he quotes, such a state may be attained by a man who can suspend his respiratory movements for 1 hour 26 minutes and 24 seconds.—The last three stages are also comprised under one distinctive name, *Sam'yama*, or 'restraining,' because it is chiefly on the perfection attained in these three collectively that depend the wonderful results promised to a Yogin when he applies them to the contemplation of special objects Such results are, e.g., knowledge of the past and future, knowledge of the sounds of all animals, of all that happened in one's former births, of the thoughts of others, of the time of one's own death, a knowledge of all that exists in the different worlds, of stars and planets, of the structure of one's own body, etc There are especially, however, eight great powers which a Yogin will acquire when properly regulating and applying the *sam'yama*—viz., the power of shrinking into the form of the minutest atom; that of assuming a gigantic body; that of becoming extremely light; that of becoming extremely heavy; that of unlimited reach of the organs (as touching the moon with the tip of a finger); that of irresistible will; that of obtaining perfect dominion over the inner organs of the body; and that of acquiring mastery over everything. If the Yogin applies *sam'yama* to the contemplation of the smallest divisions of time, and the successive order in which such divisions occur, he obtains a discrimination which enables him to understand the subtle elements, and to see all objects at once. When his intellect has become free from all considerations of self, and his spirit is no longer subject to the result of acts performed, and when both have thus attained the same degree of purity, the Yogin obtains eternal liberation.—In the last chapter of his work, Patanjali then shows that these perfections are not always obtained by Yogins in one birth, but that *Prakr'iti*, or nature (see SÂNKHYA), generally in a succession of births, brings to maturity the result obtained in a prior birth He thus makes nature, not actions, the cause of each effect; meritorious actions merely serving, according to him, to remove the obstructions which, from bad actions, would arise to its regular progress, just as water would take its natural course as soon as the husbandman, who would want to lead it from field to field, had removed the obstructions that lay in its path. After having then taught that the result of actions, in successive births, consists in the recollection of a prior state, and in the obtainment of a special existence (a special duration of life, and special enjoyments), and after having discussed the different influences to which the mind may become subject in its union to different objects, Patanjali ends with describing the mode in which final liberation gradually takes place. First, he says, when a person has obtained the discrimination conveyed by the Yoga doctrine, all ideas of self—such as, I am different

from another—cease. In consequence, thought is turned inward, and this is the beginning of liberation. But, as still recollections, derived from former existences, sometimes prevail in his mind, they must be abandoned by him in the same way as he has to overcome the afflictions above specified. When he has succeeded in this, his knowledge will have become so infinite that but little will remain for him to learn. Then the cosmical *gun'as*, or qualities, too (see SÂNKHYA), having accomplished the main object of spirit, will have gradually arrived at the end of their functions, and, as a consequence, matter will become separated from spirit. This is *kaivalya*, or true liberation, for the mere power of the mind to retain its nature after dissolution has taken place, is not yet true liberation.—The practical part of the Yoga was admitted into the later Vedânta (q.v.). Its ethical portion is especially dwelt upon in the celebrated episode of the Mahâbhârata (q.v.), the *Bhagavadgîtâ*. But the great power which it has at all periods exercised on the Hindu mind is derived less from its philosophical speculations or its moral injunctions than from the wonderful effects which the Yoga practices are supposed to produce, and from the countenance that they give to the favorite tendency of orthodox Hinduism, the performance of austerities. Frequently these practices were and are merely a cloak for imposture and hypocrisy, and the professional Yogins (q.v.), numbers of whom are met with throughout India, are often nothing but lazy mendicants or jugglers, who, by impressing the vulgar with a belief in their supernatural powers, gain an easy livelihood. Such followers of the Yoga pretend, e.g., to foretell future events; they deal in palmistry, and profess to cure diseases: see SAIVAS. There are instances, too, where, for a handsome consideration, they allow themselves to be buried for a certain time, so as to exhibit the power of the Yoga. Two such cases are related as authentic in the treatise of Navînachandrapâla; and it appears from them that a human being, after having undergone certain preparations, such as the Yoga prescribes, may be shut up in a box without either food or drink for a month, or even 40 days and nights, and yet remain alive. The author of the treatise endeavors, indeed, to show that the rules laid down by the Yoga regarding the mode of respiration, the postures, and the diet of a Yogin, may have been founded on a careful observation of the nature and habits of hibernating animals; and in support of this view, he enters into a detailed investigation of the effect of the Yoga practices on animal life. If, as it seems, his statements are correct, much of what otherwise would be incredible in the accounts given of the performances of Yogins could be received as true, because possibly admitting of explanation. The system of *Patanjali* was taught by him in a little work called *Yogasûtra*, which consists of four Pâdas, or chapters, each comprising a number of Sûtras (q.v.). The oldest commentary on it is ascribed to a *Vyâsa* (q.v.); and this was commented on by *Vachaspati-Mis'ra*. Of other commentaries, those by *Vij*

nânabhikshu, Bhojadeva, and *Nâgojibhat't'a* are the most approved.—For fuller enumeration of works on the Yoga, see *A Contribution toward an Index to the Bibliography of the Indian Philosophical Systems,* by Fitzedward Hall (Calcutta 1859). The first two chapters of the Sûtras have been translated, with annotations founded on the commentary of Bhojadeva, by the late J. R. Ballantyne (Allahabad 1853); and a paraphrase, somewhat too free, of the same commentary is contained in Vol. IV. of William Ward's *View of the History, Literature, and Religion of the Hindus, etc.* (4 vols. London 1817–20). For a brief account of the system, see also Vol. I. of H. T. Colebrooke's *Miscellaneous Essays* (2 vols. London 1837); and for the practice of the Yoga, *A Treatise on the Yoga Philosophy*—that referred to above—by N. C. Paul (i.e., Navînachandrapâla) (Benares 1851).

YOGIN, *yō'gĭn,* or YOGI: follower of the Yoga system of Hindu philosophy (see YOGA); but in popular acceptation a term generally denoting a Hindu ascetic or devotee, a man who has entered the fourth stage of religious life as described in the S'âstras. A large class of such persons form a division of the votaries of S'iva: they profess to be descendants of men who by the practice of Yoga obtained supernatural power. They go about in India as fortune-tellers and conjurors.—See SAIVAS.

YOICK, n. *yō'ĭk,* or YOICKS, n. *yō'ĭks* [from the sound made]: an old hunting cry.

YOKE, n. *yōk* [Goth. *juk;* Icel. *ok;* Ger. *joch;* Russ. *igo;* Lith. *jungas;* L. *jugum;* Skr. *yuga;* Gr. *zugon,* a yoke]: a curved wooden collar by which a pair of oxen are fastened together for the purpose of drawing a plow, wagon, or the like; a light bar of wood with straps and hooks at the ends, placed over the shoulders for carrying water-buckets, milk-pails, or the like; a piece of wood with two arms placed over the head of a boat's rudder instead of a tiller, and having two lines, by pulling which the boat is steered; a plain ungathered part of a garment, of double thickness, fitted to the part of the body to be covered (as the shoulders, in a shirt or basque, and the hips, in a skirt), and to which the 'fulness' or depending part is fastened; a mark or state of servitude; bondage; any bond or connection; a couple or pair, as of oxen; chain; link; in *Scrip.,* service: V. to put a yoke on; to couple; to restrain; to enslave. YO'KING, imp.: N. the act of coupling or joining; the harnessing and hitching up of draft-animals, as horses; in *Scot.,* one of the two divisions of the day during which a horse plows, as from morning to dinner-time (noon), or from dinner-time to six o'clock; in *mining,* pieces of wood used for designating possessions. YOKED, pp. *yōkt.* YOKE-FELLOW, or YOKE'MATE, a companion in servitude or labor; a partner. YOKEL, n. *yō'kl,* a rustic.

YOKE'-FOOTED BIRDS (Zygodactylus): see CLIMBERS.

YOKOHAMA.

YOKOHAMA, *yō-kō hâ'mâ* ('Cross Strand'): seaport of Japan: on the s. side of a bight of the Gulf of Yedo; 15 m. s. of Tokio; prefecture of Kanagawa, and opposite to Kanagawa, the town designated in the treaties as the open port; lat. 35° 26′ 11″ n., long. 139° 39′ 20″ e.; in the east of the main island commonly but erroneously called Nippon. Prior to 1859 Y. was only a small fishing-village, but rose into importance when Kanagawa was found inconvenient for a treaty-port owing to its position on the Tokaido, or great highway from Yedo to the south. Collisions were frequent between foreigners and the two-sworded retainers of the Daimios who were continually passing to and from the capital, and for the safety of foreigners it was decided to move the foreign settlement to the opposite shore. A stone causeway 2 m. long across the swamps to the new settlement was built by the Japanese govt.; piers (or *hatobas*) of solid granite were constructed; a large custom-house, official residences, houses and godowns (warehouses) for the merchants were erected, and everything done by the govt. to induce foreigners to acquiesce in the change. The change was made 1859. Later the prefectural offices of the ken or prefecture of Kanagawa also were moved to Y. The town proper stands on a plain not more than 10 or 12 ft. above sea-level, and extends along the shore about 1½ m., surrounded on two sides by a canal. The custom-house is nearly in the centre of the town; and e. and w. of it lie respectively the foreign settlement and the native town. The other noteworthy buildings in the neighborhood are the *kencho* (prefectural offices), the *saī-ban-sho* or court-house, the post-office, the U. S. and Brit. consulates, etc. The streets are curbed, well paved, and clean. The native shops are filled with goods to suit the foreign taste —such as lacquered ware of rare quality and bronze-work, baskets and porcelain, fancy silks and embroidery, curiosities and articles of *vertu*. There are no docks or wharves, all goods being loaded and unloaded from lighters. Extensive harbor-works, however, are projected by the Japanese govt., to include two breakwaters, with total length of 12,082 ft., inclosing a space of 2·01 sq. m , and an iron pier on screw-piles, carried out 1,980 ft. from the landing-place, with lines of railway leading from the pier-head to the custom-house, and thence to the railway system of the country. A dock company with a capital of three million *yen* has been incorporated. Gas was introduced into the native town and foreign settlement 1872, and in the same year a railway to Tokio was opened. More recently this railway has been extended w. down the Tokaido. Y. has 3 daily and 1 weekly newspapers in English, and 1 French daily. There are 3 churches—Anglican, Rom. Cath., and Union; and several native places of worship (the largest of which, near the English *hatoba* or landing, is used by the Union Church). Three foreign banks have important agencies here, and there are several native banks and banking-houses. Japanese, however, are not permitted to open places of business or reside in the

foreign settlement, and foreigners are similarly restricted as regards the native town.

Yokohama is the commercial centre of Japan. It is a port of call of the three great Transpacific lines between Hong-kong and San Francisco and Vancouver; and has regular weekly communication with both Hong-kong and Shanghai by several other lines, native and foreign. The chief exports are tea, silk (raw and manufactured), lacquer-ware, porcelain, bronze, etc. The chief imports are yarns, cotton and woolen goods, metals, machinery, etc.

In 1906 the value of exports from Yokohama amounted to 200,847,405 *yen*, including 106,083,274 *yen* representing raw silk, 33,045,510 *yen* silk tissue, 5,435,086 *yen* silk handkerchiefs and 4,319,174 *yen* cereals. The imports in the same year were valued at 149,070,348 *yen*, comprising 12,607,474 *yen* in rice, 9,163,177 *yen* raw cotton, 8,519,860 *yen* sugar, 8,273,977 *yen* woolen cloths, and 6,366,048 *yen* wool.

South and west of the foreign settlement is a range of low well-wooded hills (about 150 ft.), called the 'Bluff,' on which since 1869, and by the courtesy of the Japanese govt., foreigners have been permitted to lease land, and to erect villas and cottages for private residences—a privilege which has been largely availed of in consequence of the lack of good drinking-water in the settlement proper, and its general unhealthfulness. In the immediate vicinity of Yokohama is the village of Ota, noted for its potteries; and about 15 m. down the coast is the port of Yokosŭka, where are a Japanese arsenal and a navy-yard. Until 1875 both the British and the French maintained bodies of troops at Yokohama for protection of the settlement.—Pop. (1904) 326,035.

YOKOSUKA, Japan: town and naval station on the Bay of Tokio, 12 m. s. of Yokohama. It is connected with Yokohama by rail and steamer, and with Kamakura and Tokio by rail. In 1865 the Tokugawa Shogunate established there a shipyard which was subsequently transferred to the Imperial Government, and the latter converted it into a naval dockyard in 1868. The port became a naval station in 1884, barracks and other buildings being at once established. The dockyards were first constructed by French engineers; but since 1875 the work has been entirely in the hands of Japanese. There are four docks and the number of hands employed is about 15,300. The battleship Satsuma (19,000 tons) was constructed at Yokosuka. About a m. from the town is the grave of Will Adams, the first Englishman to enter Japan. Pop. 24,750.

YOKUTS ('Indians'): a group of about two dozen small tribes, forming the Mariposan linguistic stock of North American Indians, occupying an irregular area in central southern California from Fresno river in the n. to near the southern extremity of Tulare lake in the s.,

and between the Sierra Nevada in the e. and the Coast Range in the w.; also a strip, 10 to 20 m. wide, extending southeastward from Tulare lake along the eastern base of the latter range to Mount Pinos, about lat. 34° 45′, together with an isolated area, occupied by the Cholovone division, in San Joaquin Valley from the Tuolumne northward. The tribes in general were segregated by the natural features of their territory, such as river valleys, and each tribe had its hereditary chief. Their villages consisted of a single row of tule-thatched, wedge-shaped houses, with a continuous *ramada* or shelter of brush along the front. In early times, when large game was abundant, hunting formed an important pursuit, but with the coming of the whites and the disappearance of the game they were compelled to resort almost exclusively to the products of the soil and of the streams and lakes, although rabbits and quail were always abundant and were commonly trapped. Seeds of various kinds were gathered for use as food, as also were grasshoppers, caterpillars, worms, and the larvæ of insects; dogs were raised for use also as food, and even skunks were not despised; but the coyote and the rattlesnake were always tabooed. Their basketry was excellent in shape, design, and execution, and formed their chief handiwork. The Yokuts women were chaste before the settlement of their country by the whites; marriage was perhaps by purchase, the husband residing at the house of his wife; infanticide was practiced in cases of deformity; the dead were generally cremated. The Yokuts are now but a remnant of a once comparatively populous group of tribes. Early warfare with the Paiutes, who pressed them closely from the e., and later and more disastrous contact with white ruffians who found the Indians in their way, practically exterminated many of the tribes and probably wiped others away completely. Their present population is not known, but there are believed to be about 150 under the Mission Agency, and others are scattered over their old haunts, some of the tribes being represented by only half a dozen individuals or less.

YOLK, n. *yok* [AS. *geoleca*, the yolk—from *geolu*, yellow (see YELLOW)]: the yellow part of an egg; the vitellus (see EGG; VITELLUS); the oily secretion from the skin of a sheep which renders the wool soft and pliable.

YON, a. *yŏn* [AS. *geon*, yon: Goth. *jains*, yon, that: Ger. *jener*, that]: that or those, referring to some object or objects at a distance but within view; yonder. YOND, a. or ad. in *OE.*, yonder.

YONDER, a. *yŏn'dėr:* that or those: referring to an object or objects at a distance but within view: AD. at or in that place; there.

YONGAMPO, Korea: a seaport on the left bank of the Yalu estuary, near Wiju, with a large and important

harbor. It was used as a landing place by the Japanese during the Chino-Japanese war in 1894, and just prior to the Russo-Japanese war of 1904 was an important outpost of the Russian advance into Korea, and the headquarters of their timber-felling concession. Russia's strong protests against opening the port to foreign trade was one of the many events that hastened the war.

YONGE, *yŭng,* CHARLOTTE MARY: English novelist: b. 1823; d. 1901, Mar. 24. The work by which she is best known is *The Heir of Redcliffe,* which had great success and has gone through several editions. Besides this she is the author of *Heart's Ease, Dynevor Terrace, The Daisy Chain, The Lances of Lynwood, The Little Duke,* etc. These works show much literary accomplishment, and are pervaded by an amiable and pious spirit; and have secured for Miss Yonge a public of her own. They are commonly vehicles of the writer's high-church opinions. Considerable sums accruing from the sale of her writings it is said she devoted to the aid of religious missions in New Zealand. In addition to the fictions by which she was chiefly known, Miss Yonge also published a work *On Christian Names, Their History and Derivation,* in which much curious erudition is displayed; *Life of Bishop Patteson* (1873); etc.

YONKERS, *yŏngk'erz:* city in Westchester co., N. Y.; on the Hudson river, and on the New York Central and Hudson River railroad; adjoining New York, and 16 m. from its city hall. Its site is a series of hills, between which flows the Nepperham river, which provides excellent water-power for several important manufactories. Hudson river steamboats make regular stops here, and the city is connected with New York by commercial and police telegraph, and telephone. It is one of the most picturesque residential places on the river, and besides containing many costly homes of New York business men has numerous hotels and boarding-houses for summer denizens. The city is lighted with electricity, and has efficient water, sewerage, police, fire, sanitary, and municipal services. In 1900 there were more than 20 churches, every leading denomination being represented. High, grammar and primary schools; national banks and savings banks, and daily and weekly newspapers. The notable buildings in Yonkers and vicinity are the old Philipse manor-house (built 1752, now the city hall); Samuel J. Tilden's 'Greystone' residence; the Edwin Forrest 'Castle;' Motherhouse of the Sisters of Charity (Rom. Cath.); Mount St. Vincent's Acad. (Rom. Cath.); and a large Hebrew Home. Yonkers is widely known for the extent and variety of its manufactures, which include carpets, hats, hatting machinery, plows, elevators, morocco, wool, yarn, silk goods, lead-pencils, barrels, agricultural implements, rubber goods, sugar, glue, machinists' and plumbers' tools, pickles, shirts, carriages, and beer. There were, 1900, 387 factories in Yonkers, with

capital of $13,097,205; 8,615 wage-earners and products valued at $19,580,324. Mr. Tilden, in his will, made liberal provision for a public library and reading-room for Yonkers, distinct from the clause relating to the projected public library in New York which the courts declared void. The net public debt of Yonkers (1906) is $4,620,613; assessed valuation, $44,873,910; tax rate, $2.43 per $1,000.

In 1650 Adrian Van der Donck and several Dutch families settled in what is now called Yonkers. The region around Yonkers then belonged to the Dutch. It became a part of Philipse Manor in 1672 and the town was called Philipsburg. The town of Yonkers was founded in 1788, and in 1855 it was incorporated as a village. The town was divided in 1872; the northern part was chartered as the city of Yonkers and the southern part was called Kingsbridge. In 1874 Kingsbridge became a part of New York city. Pop. (1890) 32,033; (1900) 47,931.

YONNE, France: a northern interior department bounded by Seine-et-Marne, Aube, Côte-d'Or, Nièvre, and Loiret; area, 2,868 sq.m.; capital, Auxerre. The surface is generally intersected by low hills, sometimes barren, but usually covered with fruitful vineyards, which yield the famous Chablis, Joigny, Auxerre, and Tonnerre wines. Between the hills lie beautiful and productive valleys. The most elevated land is in the southwest, forming the water-shed between the basins of the Loire and Seine. The small part belonging to the former is drained by the Veille. All the rest belongs to the latter, which receives it chiefly by the navigable Yonne. The climate is temperate, and the air pure and healthful, except in some wet, marshy spots. The minerals include iron, red and yellow ochre, building-stone, lithographic stones, pavement, and potter's clay. The manufactures are of coarse woolens, woolen covers, serge, glue, etc. The trade is in corn, wine, vinegar, wood and charcoal, ship-timber, wool, cattle, iron, and ochre. Pop. (1901) 321,062.

YOOSUFZYE, or YUSUFZAI ('children of Joseph'): an important Afghan tribe, on the n.w. frontier of India. Their territory includes about 2,000 sq.m. within the British district of Peshawur and also the hills beyond the n. boundary, and their total number is estimated at 246,000, including 73,000 soldiers. The crops of the region are wheat, barley, millets, maize, cotton, and mustard seed. Iron, cattle, and wool are exported, and the transit trade is considerable.

YORE, ad. *yōr* [AS. *geara,* formerly—from *gear,* a *year*]: in *OE.,* anciently; long ago; in times past; now used only in the phrase OF YORE, of olden time; long ago.

YORITOMO MINAMOTO: Japanese soldier and statesman: b. 1146; d. 1199. He became about 1159 the leader of the military clan of Minamoto in its feud

with that of Taira. In 1180 he assembled an army of considerable strength, and began operations against the Taira, whom in 1185 he completely destroyed in the naval battle off Dan-no-ura, not far from Shimonoseki. He became practically ruler of Japan, though nominally subject to the Mikado, was made (1192) Sei-i-tai sho-gun, established his capital at Kamakura, and laid the basis of the feudal system of Japan.

YORK, v. *yawrk:* in *cricket,* to fowl with a yorker. YONK'ER, n. *-ër* [probably from its being used first by a Yorkshire player]: in *cricket,* a ball bowled so as to pitch very close up to the bat.

YORK: town, port of entry, York co., Maine; on York river, and on the Boston and Maine railroad; about 45 m. s. by w. of Portland and 100 m. s.w. of Augusta. It is in an agricultural region, but is known as a favorite summer resort. It has a number of buildings of historic interest, among which is the jail, which is one of the oldest in the country. It contains several villages in which are many summer cottages. The national bank in the village of York has a capital of $50,000. The town was set off, in 1622, from land granted by the Plymouth Council to John Mason and Ferdinand Gorges. In 1624 the place was called Agamenticus. On Mar. 1, 1640, a territory of 21 sq.m. was incorporated as a borough by Gorges, and chartered as the city of Georgeana in 1642. This was the first municipal corporation made by the English in North America. On the death of Charles I., in 1649, Georgeana City, Isle of Shoals, Wells, and Kitterytown united and established a confederacy. In 1652 the confederacy, and all of Maine came under the control of Massachusetts. The city charter of Georgeana was revoked, and the name changed to York. The limits of the present town are about as in 1652. In the early years the town suffered from Indian depredations; one attack, in 1692, resulted in the massacre or capture of about one-half the inhabitants. Pop. (1910) 2,802.

YORK: city, county-seat of York co., Neb.; on the Chicago, Burlington and Quincy, the St. Joseph and Grand Island, and the Freemont, Elkhorn and Missouri Valley railroads; 50 m. w. of Lincoln. It was settled in 1871 and in 1880 was incorporated. It is in an agricultural and stock-raising region, and its industries are connected chiefly with farm products. It has a flour mill, machine shop, foundry, large stock yards, and grain elevators. The educational institutions are York College (U. B.), opened in 1890; a high school, established in 1880; Holy Family Academy (R. C.); public and parish elementary schools and public and school libraries. The two national banks have a combined capital of $150,000. Pop. (1900) 5,132; (1910) 6,235.

YORK: city, county-seat of York co., Pa.; on the Condorus creek, and on the Pennsylvania, the York

Southern, the Northern Central, and the Western Maryland railroads; about 28 m. s.e. of Harrisburg, and 95 m. w. of Philadelphia. It is in a productive farming section and has considerable manufacturing interests. In 1900 (government census) the city had 464 manufacturing establishments, capitalized for $9,640,784. The foundry and machine finished products amounted, each year, to $2,654,772; and the tobacco products to $1,190,155. Other manufactures of which there are large and valuable outputs annually are agricultural implements, cigar boxes, food products, carriages, wagons, carriage and wagon materials, confectionery, flour and grist mill products, furniture, iron and steel products (including nails, spike, wire nails, etc.), lumber products, paper and wood pulp, shirts, and patent medicines. The vast power generated at Yorkhaven, 11 m. n. of York, will greatly increase the manufacturing industries of York. The York Haven Water and Power Company have built a crib dam to obtain a sufficient volume of water to run the large plant intended for the generation of electrical power and the distribution of this power to places in York and adjoining counties. There is an extensive trade in the manufactured products and in general merchandise which is distributed to the villages and towns of a large region. There are five national, three state, and two private banks. The combined capital of the 10 banks is $2,238,000; the annual amount of business is $11,963,412. A permanent settlement was made in 1735 by a German colony; but in 1741 the town was laid out by John, Thomas, and Richard Penn, and incorporated as a borough in 1787. In 1887 York was chartered as a city. In 1749, the first court of general quarter sessions was held here. In 1777 the Continental Congress left Philadelphia, fearing capture by Howe's army, and convened in York Sep. 30. Congress continued to hold sessions in York until 1778, June 27. Pop. (1910) 44,750.

YORK: city, cap. of Yorkshire, England; at the junction of the rivers Ouse and Foss, the three Ridings of the county meeting at the same place; and is nearly equidistant from London and Edinburgh (188 m. from London). It is the seat of an archbishopric, a county in itself, and a municipal and parliamentary borough. The govt. is vested in 12 aldermen and 36 councilors, of whom one, as in the case of London, is lord mayor. Under the territorial army organization, York is the centre of the northern milit. dist., a general officer's command.

York is one of the most ancient of Bristish cities. Before the Roman invasion it was one of the chief towns of the Brigantes, the most numerous and powerful of the British tribes. It was constituted a Roman station under the name *Eboracum*, by Agricola about A.D. 79, and was very soon the principal seat of Roman power in the north, perhaps in all Britain. While the Roman dominion existed in the island, York was a city of the

first importance. Here Hadrian lived and Severus died. Here, too, died Constantine Chlorus, father of Constantine the Great, and here, as many believe, Constantine the Great was born. When the emperors visited the province, York was their chosen residence, and it was the abode of the imperial legates when the emperors were absent. Little is known of the city for a century after the departure of the Romans, about 409; but it certainly suffered much during the long conflict between the Britons and the Picts, against whose incursions York was a material defense. It afterward became the cap. of Northumbria. The first metropolitan church in England was built here by Edwin, the Northumbrian king whom Paulinus baptized; here also Edgar, the first sole monarch of England, held 966 the Witenagemot. William the Conqueror was long unable to overcome this stronghold of the north, notwithstanding his coronation by its archbishop, Aldred. One Norman garrison, numbering 3,000 men, was put to the sword 1069; but William exacted a terrible vengeance in the following year, when he laid waste the whole country between York and Durham.

The first English parliament was held at York 1160 by Henry II., and for 500 years afterward parliaments were summoned occasionally to the ancient city. Under Henry III., the courts of king's bench and exchequer sat at York for seven years; and for a few months Richard II. removed thither the courts of king's bench and chancery. During the insurrections consequent on the dissolution of the monasteries by Henry VIII., York was seized by the insurgents of the 'Pilgrimage of Grace;' and in its immediate neighborhood Fairfax, 1644, conquered Prince Rupert on Marston Moor. The city and castle, already besieged, surrendered to the parliamentarians a few weeks later. The Brit. Assoc. was organized at York 1831, and here the jubilee meeting was held 1881.

A city so ancient necessarily presents many interesting memorials of antiquity. There are remains or memorials of Roman towers and temples, and of the earliest British churches. One of the most magnificent of the Anglo-Saxon churches was erected at York in the 8th century, and this, destroyed by fire, rebuilt, enlarged, and changed from time to time, is now known as York Minster. A portion of the original church was disinterred during the excavations which followed the burning of the minster 1829. The present structure of this Cathedral of St. Peter is as a whole the most imposing work of ecclesiastical architecture in England, and takes rank with the finest specimens of Gothic architecture in the world. It was built mainly in the 13th and 14th centuries, and represents the designs of successive architects. Its length, from base to base of the buttresses, is 524 ft., and its extreme breadth 250 ft., being 24 ft. longer than St. Paul's Cathedral, and 149 ft. longer than

Westminster Abbey. The magnificent east window is 75 ft. high and 32 ft. broad, and contains about 200 compartments, each a yard square, representing scriptural subjects. The view across the great transept is very impressive. War and fire have conspired to deform or destroy this splendid cathedral. Twice it has been burned down, 1069 and 1137, each time to rise more beautiful than before. During the times of the Commonwealth, much damage was done by war and wantonness, and several of its older monuments were mutilated or broken. In 1829 it was set on fire by Jonathan Martin, a maniac; and the roof of the choir, 222 ft. long, with all the woodwork on each side, was destroyed. While this disaster was being repaired, a workman's candle was carelessly left burning, one night in 1840, and again a terrible fire broke out, destroying the s.w. tower, with its splendid peal of bells, and the roof of the nave. The cost of the repairs exceeded £100,000.

A monastery of Benedictine monks was built, or rather completed, at York in the time of William Rufus, which was in great part reconstructed about the end of the 13th c. Its abbot had a mitre and a seat in parliament. Some portions of the original building yet remain. Thirteen seceders from this monastery established 1131 the neighboring Abbey of Fountains, near Ripon, under Cisterian rule. On the site of the Benedictine monastery now stand the museum and gardens of the Yorkshire Philosophical Soc. The same order had a priory dedicated to the Holy Trinity in Micklegate, and a nunnery outside the walls at Clementthorp. Besides these, the Dominicans, Franciscans, Augustinians, and Carmelites had each a monastery, and the Gilbertines a priory, within the city. In the immediate neighborhood were 16 hospitals. At the Reformation, York contained 41 parish churches, 17 chapels, 16 hospitals, and 10 religious houses. 22 of the churches yet remain, and several new churches have been built. The Rom. Catholics have a fine pro-cathedral. There are many places of worship for dissenters.

The educational institutions of York are numerous and useful. Notable among them are St. Peter's School, founded 1557; Archbishop Holgate's Free School, dating from the time of Henry VIII.; the Blue Coat School for boys, and the Gray Coat for girls, supported chiefly by annual subscriptions; and the Yorkshire School for the Blind, conducted in a palace built originally for the lord pres. of the Council of the North. York publishes one daily and three weekly newspapers. The building erected for a fine-art exhibition 1879 contains a concert-hall and picture-galleries. The Yorkshire Philosophical Society, formed 1822, has a handsome building and gardens on the site of St. Mary's Abbey, with a museum, rich in antiquarian relics and specimens illustrative of natural history. Among public institutions are the County Hos-

pital, the first in England n. of the Trent; the Lunatic Asylum; the Dispensary; and the Friends' Retreat. The ancient castle, except its imposing Clifford's Tower, is superseded by the modern and commodious assize courts. The Guildhall, a fine Gothic building, was erected 1446.

Whatever the trade of York may have been in ancient times—and old writers speak of it in glowing terms—it is small now. The making of leathern gloves, combs, glass, etc., supplies employment to many; there are iron foundries, flax-spinning, and manufacture of linen; and of late the construction of railway cars has become an industry.—The area of the city was enlarged 1884 from 1,979 acres to about 3,550 acres. Pop. (1901) 77,793.

YORK, Henry Benedict Mary, Duke of, Cardinal, and Bishop of Frascati: last male descendant of the royal House of Stuart: 1725, Mar. 26—1807, July 17; b. Rome; second son of James (III. of England), commonly known as the Pretender. York, after the failure of the attempt of his elder brother, Charles Edward, 1745, resolved to enter the priesthood. He was admitted to tonsure and minor orders by Benedict XIV., and created cardinal 1747. Clement XIII. consecrated him bishop of Corinth *in Partibus infidelium*, and afterward of the suburban see of Frascati, where he made his residence. He received also, through the favor of the crown of France, the revenues of two abbeys, which he held *in commendam*, as well as a pension from the Spanish court; and the liberal charity with which he dispensed his income among the poor, and for the various religious necessities of his diocese, endeared him to his flock. These resources were lost at the revolution; nevertheless, in the distresses of the holy see which ensued, Cardinal York sold his family jewels for the purpose of relieving Pius VI. in his necessities. On the occupation of Rome, he withdrew to Venice; but returned 1801, on the restoration of the papal authority under Pius VII. George III., having become aware of the failure of his former means of income, granted him a pension of £4,000 a year, which he received till his death. Those to whom a printed record of the 'last of the Stuarts' may be interesting, will find a small collection of his 'Pastoral Letters' in a 4to volume published in Rome, entitled *Appendix ad Tusculanam Synodum a Celsitudine Regia Eminentissimi Henrici Episcopi Tusculani* (Rome 1764). He was appointed by Pius VII. dean of the Sacred College, and held several other dignities, and was much respected by the Italians and by foreigners visiting Rome. He died at Frascati. His last will, an interesting document, is printed by Artaud in his *Vie de Pie VII.* His monument, by Canova, in St. Peter's, was erected by order of the prince regent, afterward George IV.

YORK, House of: see Plantagenet.

YORK COLLEGE: located at York, Neb. It was

founded under the auspices of the United Brethren in Christ, and was opened to students in 1890. It is under the control of a board of trustees composed of five members at large and representatives of four conferences of the United Brethren. Instruction in physical training is given, and an organization of college cadets is maintained for military drill; there is also a field for athletic sports on the campus. The students maintain Young Men's and Young Women's Christian Associations, and two literary societies. The library has 1,500 volumes, the students number 301, and the faculty 13. York College is considered one of the leading institutions of higher learning in Nebraska.

YORK RIVER: stream in Virginia, formed by the union of the Pamunkey and Mattapony, flowing s.e. to Chesapeake Bay, nearly opposite Cape Charles. It is 40 m. long, and 1 to 3 m. wide. Yorktown, an ancient but decayed port, is on the right bank, 10 m. from its mouth.

YORK'IST, n.: in *Eng. hist.*, an adherent of Edward, Duke of York, afterward Edward IV., King of England. The emblem of the Yorkists was a white rose: see ROSES, WAR OF THE.

YORK'SHIRE, England: the largest county of the kingdom, bounded on the north by the Tees, separating it from Durham, e. by the North Sea, s. by Lincoln, Nottingham, Derby, and Chester, and w. by Chester, Lancaster, and Westmoreland; area, 6,067 sq.m. Yorkshire is divided into trithings, or three ridings, respectively the n., e., and w. ridings, each riding having a separate lord lieutenant. The main portion of the county forms a large central valley stretching s.e. to the Humber, flanked on one side by the Pennine range and on the other by the Cleveland Hills, and drained chiefly by the Ouse and its tributaries. Considerably more of the North Riding is pasturage than under cultivation, but it includes the vale of York, with an area of about 1,000 sq.m., in which there is much fertile land growing all kinds of crops. It also includes the Cleveland district, with its great bed of iron ore. In the North Riding is the capital of the whole county, York; Scarborough, a favorite watering place; and Whitby, famous for its jet. In the East Riding the area under cultivation greatly exceeds that laid down in permanent pasture. Its industrial activity is centered in the great seaport of Hull. In the West Riding the proportion of land laid down in permanent pasture is larger than in any other, being two-thirds of that under cultivation. The West Riding has long been famous for its woolen and worsted manufactures, of which it is now the chief seat. Their development has been in modern times aided by the proximity of coal and iron. The great coal field of the West Riding yields not only the Silkstone bituminous coal, most valuable as a house coal, but also the Barnsley thick coal, semi anthracite. Leeds produces

every variety of woolen goods; Bradford, mixed worsted fabrics and yarns; Dewsbury, Batley, and adjoining districts, shoddy; Huddersfield, plain goods, with fancy trouserings and coatings; and Halifax, worsted and carpets, Barnsley is famous for its linen manufactures, of which Leeds also is a seat, as well as of that of leather. Next to the woolen and other textile industries comes the manufacture of iron and steel machinery, and implements of every description. Leeds is one of the principal seats of all kinds of mechanical engineering, and Sheffield of iron-work and cutlery. Total population of Yorkshire (1901) 3,585,122.

YORK'SHIRE-FLAGS, n. plu. [from *Yorkshire* co., England]: building flags, of Carboniferous age; brought for building purposes from Halifax, Bradford, and Rochdale in Yorkshire. They readily absorb water, and are apt to flake when placed in damp situations. YORK'SHIRE-GRIT, n., a peculiar kind of stone used for polishing marble, as also engravers' copper plates. YORK'SHIRE-PUD'DING, n. a batter-pudding baked under meat.

YORK'TOWN, Va.: town, county-seat of York co.; on the York river, 7 m. from its mouth, and 68 m. s.e. of Richmond. It has regular connection with the Chesapeake and Atlantic ports by means of the Old Dominion and other lines of steamers. York is one of the oldest settlements of the United States; it contains the oldest custom-house in the country. It is famous for having been the place where Lord Cornwallis surrendered, and a monument has been erected in honor of the event. In August, 1781, Cornwallis, with a force of 8,000 men, took possession of the place, threw up earthworks and fortified the town. He was supported by several British vessels in the York river. Fortifications were erected also at Gloucester Point, opposite Yorktown. Washington left his headquarters on the Hudson on Aug. 19, and traveled by land to Philadelphia, then to Elkton, at the head of Chesapeake Bay, and down the bay, arriving at Williamsburg Sept. 14. His force consisted of 7,000 French under Rochambeau and 9,000 Americans. On Sept. 29 Washington and his men invested Yorktown. He was assisted by a French fleet under Count De Grasse, who blocked the river in such a way that the British were unable to send assistance to the soldiers at Yorktown. Clinton had sent reinforcements to Cornwallis, but De Grasse prevented the landing. The first parallel was established on Oct. 9, and the Americans opened fire and destroyed some of the British guns. The next day three large transports and a frigate were destroyed. The attack was renewed on the 11th and again on the 14th. On the 17th Cornwallis offered to capitulate, and on the 19th he surrendered. The American loss, including the French, was about 300 killed, wounded, and missing, and the British

loss was about 550. This was the last important battle of the revolutionary war. Pop. 300.

YORKTOWN, SIEGE OF, IN THE CIVIL WAR: In 1862, Apr. 4, General McClellan, with 58,000 men and about 100 guns, started from Fort Monroe up the York Peninsula for his campaign against Richmond. His plan of operation was to move in two columns, one on the right direct to Yorktown, and another along the James river westward of and beyond Yorktown to the vicinity of Williamsburg. Should the Confederate works at Yorktown and Williamsburg offer serious resistance he designed to land General McDowell's First corps, reinforced if necessary, on the left bank of the York or on the Severn, and move it on Gloucester and West Point, in order to take in reverse whatever force the enemy might have on the peninsula and compel him to abandon his positions. At the end of the first day's march General Heintzelman's Third corps on the right bivouacked at Howard's Bridge and Cockletown beyond, and General Keyes's Fourth corps on the left, at Young's Mill, near James river. On the 5th Keyes resumed his march for the Halfway House, between Yorktown and Williamsburg, but had hardly got on the road when it was ascertained that a large force of the enemy, with a battery, was at Lee's Mills, 6 m. beyond, barring the way over the Warwick, which, according to the maps, should not have run in that direction. Keyes advanced, and in the afternoon found the situation as reported; and after some artillery-firing he encamped for the night. On the right Heintzelman advanced to near Yorktown, came under artillery-fire from the works, and encamped fronting them, where he was destined to remain a full month. Yorktown, as well as the line of the Warwick southward to James river, was held by Gen. J. B. Magruder, with about 11,000 men. For ten days McClellan remained in front of Magruder, making some reconnoissances, but no serious demonstrations. He was engaged in bringing up troops and guns preparatory to a regular siege, and was asking for heavy reinforcements and more heavy siege-guns. He was compelled to adopt the slow method of a siege from his exaggerated idea of the Confederate strength in his front and by the fact that McDowell's corps of 33,400 men, which he had proposed using to flank Yorktown, by Gloucester and West Point, had been withheld from him, to protect Washington. Under the direction of Gen. Fitzjohn Porter, who was made director of the siege, Gen. J. G. Barnard, chief of engineers, and Gen. W. F. Barry, chief of artillery, the operations were conducted elaborately and with great skill. Gen. Barry reports that the siege train consisted of 101 pieces, as follows: 'Two 200-pounder Parrott rifled guns, 11 100-pounder Parrott rifled guns, 13 30-pounder Parrott rifled guns, 22 20-pounder Parrott rifled guns, 10 4½-in. rifled siege guns, 10 13-in. sea-coast mortars, 10 10-in. sea-

coast mortars, 15 10-in. siege mortars, 5 8-in. siege mortars, and 3 8-in. siege howitzers. Three field batteries of 12-pounders were likewise made use of as guns of position. These guns were mounted on very elaborate works, some 15 in number, established opposite the town and the works to its right, at ranges varying from 1,500 to 2,200 yds. In number and weight of metal they were far superior to those of the Confederates. On the 17th Gen. J. E. Johnston had been assigned to the defense of the peninsula and Richmond, and he had on the Yorktown and Warwick line not to exceed 50,000 men. He made no strenuous effort to interfere with McClellan's operations, but determined to hold his position until McClellan was ready to attack and then to fall back without waiting to have his troops driven from their works. By April 30 McClellan had present for duty 115,102 men, including Franklin's division that had been sent to him to turn Yorktown by Gloucester Point or West Point, but which since its arrival on the 20th had been kept on board transports. On May 1 McClellan proposed to open fire on the morning of the 6th with all his guns, and to press the siege until final assault should be deemed practicable. But on April 27 Johnston had learned that McClellan's batteries were approaching completion and would be ready to open fire in 5 or 6 days, and he made his dispositions for retreat. On the night of May 3, leaving some serviceable heavy guns behind, he evacuated Yorktown and fell back to Williamsburg on the way to Richmond.

YORK'VILLE, S. C.: town, county-seat of York co.; on the South Carolina & Georgia extension and the southern railroads; about 85 m. n. of Columbia. It is in an agricultural region, in which are valuable deposits of iron. It has iron works, machine shops, saddle and harness factory, spoke and handle works, and lumber mill. There are 7 churches and 2 graded schools (including high school departments), one for colored and one for white pupils. The savings bank has a capital of $50,000. Pop. 2,080.

YORNUT, n. *yŏr'nŭt* [Dan. *jordnöd*, the earthnut]: in *bot., Bunium flexuosum;* the same as EARTHNUT.

YORUBA, *yor'ū-bâ*, or YARIBA, *yăr'ĭ-bâ:* country of w. Africa; 6°—9° n. lat., 3°—7° e. long.; formerly the whole region of the Yoruba tribes and language, from the Bight of Benin n. toward Borgu, and e. from Dahomey to the Niger and its delta—about 40,000 sq. m., but since the Fulah invasion 1821 reduced by the transfer of its n. part to the Fulah state of Gando. The region is described as an elevated, sloping, cultivated plain in the n., and as undulating in the s.—both portions alike abundant in crops and in beautiful flowering trees and shrubs, giving the country the aspect of a garden, though the s. part gradually sinks toward the coast and becomes covered with dense primeval forest. Along the

coast a great navigable stretch of sheltered water is inclosed in the coast-lagoons between the outer and the inner shores: into these lagoons the chief rivers discharge with sluggish current. Lagos, on the coast, is occupied by the British, and from this point they exercise a general control over the Yoruba region. There are a number of kingdoms or chieftaincies, and 10 or 12 great cities (pop. ranging from 40,000 to 150,000 each), or rather clusters of rudely walled towns, of which one of the chief is Abeokuta. Many of these cities have originated in recent times by the gathering of the people together for mutual protection from the slave-hunters who have long ravaged this region.—The people are of a negro type somewhat less pronounced than their neighbors in Dahomey: they practice agriculture and some of the useful arts; and are distinguished above all the surrounding races for their peaceable, industrious, and hospitable disposition; also for their susceptibility to the influences of Christianity.—Pop. of the whole Yoruba Land estimated more than 2,000,000.

YOSEMITE VAL'LEY, *yō-sĕm'ĭ-tē:* cleft in the w. slope of the Sierra Nevada, in Mariposa co., near the centre of Cal.; about 155 m. s. of e. of San Francisco. The name Yosemite is an Indian word meaning 'large grizzly bear.' This celebrated valley, noted for the sublimity and beauty of its scenery, is about 6 m. long and half a m. to a m. in breadth, and has the peculiarity of being sunk about a m. below the level of the surrounding country, though it is nearly 4,000 ft. above sea level. The visitor is awed by the massiveness of its mountain elevations, the nearly perpendicular walls which shut it in throughout its entire length, and the grandeur of its waterfalls, in some respects the most remarkable in the world. The valley, traversed by the winding Merced river, has in its lower portion the appearance of a vast flower-garden, with plants, shrubs, and flowers of every hue. Of its world-famous falls, the Bridal Veil—so named because the column of water forming the fall seems to flutter in the wind like a veil—leaps at one bound of 630 ft. upon a slope, down which it rushes in a series of cascades still farther for a perpendicular distance of 300 ft. From the bottom it has the appearance of a direct fall of 900 ft. The Virgin Tears Fall, on the left side of the valley, just opposite, has a sheer descent of 1,000 ft. The Yosemite Fall, one of the most wonderful features of the scenery in this valley, has a first vertical leap of 1,500 ft., with a series of cascades; the Nevada Fall has a height of 600 ft. While in most of the other falls there is plenty of water throughout the year, the Yosemite and Bridal Veil dwindle into insignificance in Aug. and Sep., because of the drying up of the streams: they are seen at their best in May and June, and in July. Of the massive granite elevations with which the valley is hemmed in, that of the Cathedral

Rock, a little above the falls, is 2,660 ft. high; Sentinel Rock, 3,043, its termination being a slender obelisk 1,000 ft. high, and Sentinel Dome, 4,150; El Capitan presents a squarely cut, lofty, and imposing face of rock, rising 3,300 ft.; Three Brothers, 3,830; North Dome, 3,568; and Half Dome, 4,737. Between the latter two lies a lake with wonderful reflections, called Mirror Lake. Near Cathedral Rock single granite columns 500 ft. high stand out from the mighty walls of the valley, and are known as the 'Spires;' and other strange formations are numerous in the rocky walls, besides many smaller cascades. Where the main valley ends, it branches into three distinct but narrower cañons. The Little Yosemite Valley, about 4 m. long and from a half to one m. wide, is a continuation of the larger valley. The celebrated Mariposa Grove of big trees is about 16 m. s. of this valley (see SEQUOIA). There are several hotels in the Yosemite Valley for accommodation of visitors; and encampments of Digger Indians are still seen there. Including the journey to and from the valley, about a fortnight is required to see it thoroughly, from San Francisco. The Yosemite Valley was discovered 1851 by a party under Capt. Boling in pursuit of some predatory Indians; it began to be visited by tourists 1855; and by act of congress 1864 it was committed to the state of California, to be held inalienable for all time, for the use, resort, and recreation of the public. See Appleton's *Handbook to the United States,* and Whitney's *Yosemite Guide Book.*

YOTE, or YOAT, v. *yōt* [AS. *geótan,* to pour]: in *prov. Eng.* and *OE.,* to pour, as melted lead into joints; to pour, as water. YO'TING, imp. YO'TED, pp.

YOU, pron. *yô* [AS. *eow*]: the nominative and objective plu. of *thou: you* is now commonly used in ordinary language for *thou* and *thee,* and is thus sing. or plu.

YOUATT, *yô'at,* WILLIAM: English veterinary surgeon: 1777-1847, Jan. 9. He was a prof. in the Royal Veterinary College, London, and 1828 established *The Veterinarian,* the first periodical of its kind. He published *On Canine Madness* (1830); *The Horse* (1831); *Sheep: Their Breeds, Management, and Diseases* (1832); *Cattle, etc.* (1834); *Obligation and Extent of Humanity to Brutes* (1839); *The Dog: Its History and Diseases* (1842); *The Pig,* etc. (1860); and *The Complete Grazier* (11th ed. 1864). His works have been standard authorities, and several have passed through numerous editions.

YOUGHAL, *yaw'hawl* or *yawl*: a seaport and municipal borough of Innakilly barony, county Cork, Munster, Ireland; lat. 51° 57′ n., long. 7° 52′ w.; on the estuary of the Blackwater, 157 m. s.w. of Dublin. The town has some structures of interest—the parish church, formed of the nave and aisles of the ancient collegiate church, built by the Earl of Desmond 1464; the 'clock-gate;' and

Sir Walter Raleigh's house, which remains nearly in its original state. There is a handsome Rom. Cath. church, also churches of several other denominations; two convents; and several benevolent institutions. The trade of Youghal is chiefly in export of agricultural product. The harbor, obstructed by a bar, does not admit vessels of more than 400 or 500 tons burden; the fisheries are extensive and valuable, and employ a considerable number of hands. There are several remains of buildings, civil, ecclesiastical, and military; and, according to the local tradition, the potato was planted first at Youghal by Sir Walter Raleigh.—Pop. (1861) 6,328; (1871) 6,081; (1881) 5,826; (1901) 5,400, largely Rom. Catholics.

YOUMANS, *yô'manz,* EDWARD LIVINGSTON, M.D.: popular scientist: 1821, June 3—1887, Jan. 18; b. Coeymans, N. Y. From his early youth he suffered from ophthalmia, but with the aid of his sister he made large acquisitions in knowledge. In 1851 he prepared a color chart illustrating the laws of chemical combination; this was used extensively in schools. The next year he began, and for many years continued, to give lyceum lectures. Meanwhile he studied medicine and took the degree M.D. Becoming interested in the evolution doctrines, he did much to promote the circulation in this country of Spencer's philosophy, on which his writings were issued at first in serial numbers by the Messrs. Appleton. He also instituted the *International Scientific Series* of small books 1871; and 1872 the *Popular Science Monthly,* which he edited until his death. His writings and compilations include *Alcohol and the Constitution of Man* (1853); *Handbook of Household Science* (1857); *The Correlation and Conservation of Forces* (1864); and *The Culture Demanded by Modern Life* (1868). He died in New York.—His brother, WILLIAM JAY YOUMANS, M.D., b. Saratoga, N. Y., 1838, Oct. 14, studied in the Sheffield Scientific School, Yale; graduated in medicine from the Univ. of New York; pursued natural history abroad under Prof. Huxley; practiced medicine in Minn.; and, from an assistant in editing the *Popular Science Monthly,* became its chief editor on the death of his brother. He wrote on science for Appleton's *Annual Cyclopædia;* and he was editor of the *Popular Science Monthly* and of Huxley's *Physiology,* adding to it chapters on hygiene. He died 1901, April 10. Their sister, ELIZA ANN YOUMANS, b. Saratoga 1826, Dec. 17, assisted her brother Edward; published books on botany for children and youth; also a translation of Quatrefage's *Natural History of Man* (1875); *Descriptive Botany* (1885); and *Bentley's Physiological Botany,* abridged (1886).

YOUNG, a. *yŭng* [Goth. *yunda,* youth; AS. *geong;* Dut. *jong;* Icel. *ungr;* Dan. and Sw. *ung;* Ger. *jung,* young: Skr. *yuvan;* L. *juvenis;* W. *ieuanc,* young]: in the early part of life, growth, or existence; not long born; not far advanced or developed; having little ex-

perience; ignorant; juvenile; fresh; youthful; N. the offspring of animals. YOUN'GER, a. comp. *-gĕr,* young in a greater degree: N. in *OE.,* a youngling. YOUN'GEST, a. superl. *-gĕst,* young in the greatest degree; last born; most recent. YOUNG'ISH, a. *-ĭsh,* somewhat young. YOUN'GLING, n. *-glĭng,* an animal in the first stage of life. YOUNG'LY, ad. *-lĭ,* in youth, as a *young* and inexperienced person; early in life: ADJ. in *OE.,* youthful. YOUNKER, a. *yŭng'kĕr,* a youngster. YOUNG'STER, n. *-stĕr,* a young person. YOUNGTH, n. *yŭngth,* in *OE.,* youth.

YOUNG, *yŭng,* ALEXANDER, D.D.: clergyman: 1800, Sep. 22—1854, Mar. 16; b. Boston. He graduated at Harvard 1820; studied divinity; taught in the Boston Latin School one year; and was pastor of the New South Unit. Church, Boston, 1825-54. He was on the Harvard board of overseers 1837-53, and corr. sec. of the Mass. Historical Soc. 1849-54. He published several notable funeral discourses; also *Chronicles of the Pilgrim Fathers of the Colony of Plymouth from 1602 to 1625* (1841), and *Chronicles of the First Planters of the Colony of Massachusetts Bay from 1623 to 1636;* and edited *Library of Old English Prose Writers* (1831-34).

YOUNG, *yŭng,* ARTHUR: English writer on agriculture: 1741, Sep. 7—1820, Feb.; son of the rector of Bedingfield, Suffolk. In 1758, he was apprenticed to a mercantile house in Lynn; but he had no liking for business, and gave much attention to literature. On his father's death, 1759, he undertook the management of a small farm, of which his mother had a lease; and 8 years afterward he became a farmer on his own account in Essex. He seems at the same time to have acted as a parliamentary reporter; and as he saw his farm only from Saturday till Monday, it is not strange that he found it unprofitable. At the end of 5 years he gave £100 to a practical farmer to take the lease off his hands. Meantime he had made notes of the results of numerous experiments on his farm, which he afterward published, under the title *A Course of Experimental Agriculture.* His first successful book was *A Tour Through the Southern Counties of England;* which was followed by other works, describing agriculture in various parts of England and in Ireland. The enthusiasm of Young, and his lively style, made his writings popular, and by them the knowledge of many judicious practices, confined to one locality, was spread throughout the kingdom. In 1784 Young began the publication of the *Annals of Agriculture,* of which 45 vols., 8vo, were published. Three years later he was invited by Count de la Rochefoucauld to make a tour in s. France. What he saw induced him to undertake a series of tours in France, through a great part of which he traveled leisurely on horseback. The result was his most important work, *The Agricultural Survey of France.* The author did not confine his attention to agriculture, but described

the social and political condition of the people in a lively and truthful manner, and his work has become, in consequence, the most trustworthy source of information regarding the state of France just before the Revolution. Similarly his *Tour in Ireland* shows him to have been an observant and thoughtful political economist. In 1801 the French Directory ordered the whole of his agricultural works to be translated into French: they were published at Paris, 20 vols., 8vo, under the title *Le Cultivateur Anglais*. In 1808 Young received a gold medal from the English board of agriculture, 'for long and faithful services in agriculture.' Young's writings are deemed to have laid the foundation of a practical agricultural literature.

YOUNG, BRIGHAM: Mormon president: 1801, June 1—1877, Aug. 29; b. Whittingham, Vt.; son of a small farmer proprietor. He learned the trade of a painter and glazier. He belonged to the Baptist Church; but in 1832, having become converted to Mormonism, he was made an elder of the Church of the Latter-Day Saints, and began to preach at the Mormon settlement at Kirtland, O. In 1835 he was appointed one of the 12 apostles of the church, and was sent as a missionary to the New England states, where he was successful in making converts. After the Mormons had been driven from Kirtland to Missouri and from Missouri to Illinois, and after Joseph Smith (q.v.) had been murdered by a mob (1844), Young was chosen pres. in his place. The year following, the charter of Nauvoo was repealed by the legislature of Illinois; and after a cannonade of three days the Mormons were driven from their capital and temple, and were led by Pres. Young to Utah, where they arrived, after a toilsome journey, 1847, July 24. Next year the great body of Mormons arrived and founded Salt Lake City; and 1850 Pres. Fillmore appointed Young gov. of the territory for four years. In 1854, in consequence of the Mormons setting the federal laws at defiance, by having in 1852 proclaimed polygamy as the 'celestial law of marriage,' Col. Steptoe was appointed gov. in Young's place; but on visiting Utah he thought it an unsafe residence, and resigned. The Mormon pres. exercised supreme authority, and said: 'I am and will be governor, and no power can hinder it until the Lord Almighty says, "Brigham, you need not be governor any longer."' In 1857 a new governor, Cumming, was appointed, and sent with a force of 2,500 United States troops to protect him and the federal officers; but Young forbade them to enter the territory, and cut off the supply trains. A compromise was, however, effected; the Mormons were pardoned, and the troops remained until 1860. The determination of the United States to abolish polygamy, and the appointment 1869 of a new United States gov., somewhat reduced Young's authority. In 1874 his 15th wife petitioned the

U. S. courts for a divorce and separated from him. Young, at his death, left an estate of two million dollars to 17 wives and 56 children.—See MORMONS, SALT LAKE CITY, UTAH.

YOUNG, CHARLES AUGUSTUS, PH.D., LL.D.; astronomer: b. Hanover, N. H., 1834, Dec. 15; d. 1908, Jan. 4. He graduated at Dartmouth 1853; was classical teacher in Phillips Acad., Andover, 1853-56, pursuing theol. study during the last year; and was prof. of mathematics, natural philosophy, and astronomy in Western Reserve College, O., 1856-66, in 1862 serving three months as captain of a volunteer company of students. In 1866 he was called to the chair of natural philosophy and astronomy at Dartmouth, a professorship which had been filled by his father, Ira Y., and by his grandfather, Ebenezer Adams. During the total eclipse of the sun 1869, Aug. 7, he was stationed at Burlington, Ia., and made spectroscopical observations separating in the corona the iron line D 1,474 of the solar spectrum from one peculiar to the corona. In 1870 he observed the eclipse from a station in Spain, and found that in the lower strata of the sun's atmosphere the spectrum lines, dark as ordinarily observed, indicating elements in a gaseous condition, are converted into bright lines, showing that to a considerable extent the elements or their compounds exist probably as minute incandescent droplets near the body of the Sun; this lower portion of the solar atmosphere is called the 'reversing layer.' In 1872 he made further observations at Sherman, Wyo., detecting sulphur, cerium, and strontium in the chromo-sphere. He went to China 1874, to observe the transit of Venus. From 1877 to 1906, when he retired and became prof. emeritus, he was prof. of astronomy at Princeton. By an original application of the principle that the approach or recession of stars affects the wave-lengths of light as received by the spectroscope, he measured the sun's rate of rotation, and especially the relative velocity of the surface as compared with the deeper strata. An automatic spectroscope invented by him came into general use. He also devised a method of increasing dispersion by passing the ray again through prisms by reflection. He lectured with great acceptance before leading institutions; was elected to memberships and offices in learned associations, American and foreign; contributed much to scientific and other journals; and published *The Sun* (1882); *A Text-book of General Astronomy* (1888); and *The Elements of Astronomy, with a Uranography* (1890). In 1891 he received the Janssen prize from the French Acad. of Sciences, awarded for the most important researches in physical astronomy. In reference to his observations on the sun's rotation, Prof. Richard A. Proctor said he had 'effected the most delicate piece of spectroscopic observation yet achieved by man.'

YOUNG, EDWARD, D.C.L.: author of the well-kwown *Night Thoughts:* 1681-1765, Apr. 12; b. Upham, near Winchester, England; son of the rector of that parish, who was also dean of Sarum. He was educated at Winchester School, and 1703 went to Oxford. In 1708 a law fellowship in All Souls' College was conferred on him by Abp. Tenison. He seems to have done nothing in the law, occupying himself, by preference, with poetry and religious studies. In 1714 he obtained his degree B.C.L., and 1719 D.C.L. Meantime he had come before the world as a poet, publishing 1713 an *Epistle to George, Lord Lansdowne,* on his being created a peer. This was a characteristic beginning for Young, who was one of the most persevering and invincible toadies that ever flattered a patron. In the same year he published two other poems—*The Last Day;* and *The Force of Religion, or Vanquished Love;* the year following he again flowed forth in *A Poem on the Death of Queen Anne.* These performances procured him immediate reputation. In 1719 he ventured on the more ambitious effort of a tragedy, which, under the title *Busiris,* was brought out at Drury Lane. The piece had a fair success; and probably through it he attracted the notice of the eccentric Duke of Wharton, with whom, in the end of that year, he was induced to go for a short time abroad. The duke seems to have entertained for him a real kindness, and to have treated him with much liberality. At the duke's death Young set forth certain claims against his estates, which he succeeded in making good to the extent of an annuity of £200. The details of the case involve nothing dishonorable to Young, yet convey a somewhat unpleasing impression. In 1721 was produced his tragedy *The Revenge,* which, unsuccessful at the time, has since had greater acceptance, and is the only one of his pieces still occasionally acted. His third and last attempt in this field, *The Brothers,* was produced 1753. In succession 1725-28 appeared his satires, under the title *The Love of Fame, the Universal Passion.* These had great success, and brought to their author money as well as fame: they abound with wit and vivacious observation, and even now will well repay perusal. Of *The Instalment,* a poem, issued 1726, and addressed to Sir Robert Walpole on his being made a knight of the Garter, it seems enough to say that, inasmuch as we incidentally hear from Swift of a pension granted Young, we may surmise that this was the service to the public by which he had contrived to earn it. In 1727 Young, having taken holy orders for the purpose, was appointed one of the royal chaplains; and in 1730 he became rector of Welwyn, in Hertfordshire. The next year he married Lady Elizabeth Lee, daughter of the Earl of Lichfield, and widow of Colonel Lee. He is supposed to have been very happy with her, as he showed great grief on her death 1741. It is believed that from his solemn meditations on the event he got the suggestion of the *Night Thoughts,*

begun shortly after, and published 1742-46. By this work almost solely it is that he is remembered. His mind retained its activity to the last. He published other works, now entirely forgotten; and 1762 superintended a collected ed. of his works, 4 vols. 12mo, from which he had the grace to exclude certain of the most fulsome of his dedications, probably as having served their turn, and not likely to be of further use. Since his death his *Night Thoughts* has passed through editions innumerable: it displays much gloomy force of pious reflection; and has passages of fine imagination, frequently somewhat marred by an epigrammatic mannerism of expression. Certain of its sententious lines have passed into common use and become in a manner proverbial. Though now somewhat declined from the estimation in which he was long held, Young will doubtless continue to hold a distinct and even high place in that interval in our literature which divides the artificial and so-called classical school of Pope from the return to a simpler and more natural manner, heralded some time afterward by Cowper. If we except Young's one great weakness of character—an inordinate appetite for preferment and worldly honors, which sought its gratification in ways somewhat servile and unworthy—there seems every reason to believe that Young was, on the whole, an excellent and worthy man.

YOUNG, James: British chemist: 1811, July—1883, May 13; b. Glasgow. He began the study of chemistry under the eminent Prof. Thomas Graham in Anderson Coll.; became his assistant; was with him in University Coll., London, 1832-38; and was afterward in the chemical works at St. Helen's and at Manchester. About 1847 he began experiments on mineral oil from a Derbyshire coal mine, and produced from it lubricating and burning oils. He next invented a method of slow distillation of oil from bituminous shale, thus founding a great oil industry in Scotland, which brought him ample returns. His experiments on mineral oil led to development of its value in this country. He also discovered the use of lime in preventing the corrosion of ships by bilge-water. A chair of technical chemistry was founded by him in Anderson Coll.; and he fitted out an expedition to Africa, which ascertained the death and discovered the body of Dr. Livingstone 1872.

YOUNG, Sir John, Baron Lisgar, English statesman: b. Bombay, India, 1807, Aug. 31; d. Ireland, 1876, Oct. 6. He was graduated at Oxford in 1829, called to the bar in 1834, and sat in the House of Commons in 1831-45. He was lord of the treasury 1841-4; secretary of the treasury in 1844-6; chief secretary for Ireland in 1852-5; and lord high commissioner of the Ionian Islands 1855-9. He succeeded to the baronetcy on the death of his father in 1848 and from 1860 to 1867 was governor to New South Wales. Appointed governor-general of Canada in

1868, he filled this post till 1872, when he was succeeded by the Earl of Dufferin. During his Canadian governorship he suppressed the Riel rebellion of 1870 and was rewarded with the title of Baron Lisgar.

YOUNG, JOHN, LL.D.: Scotch divine: b. about 1810. After studying theology, he was pastor of Albion Chapel, Moorfields, and later of a church in Edinburgh. He is author of *Lectures on the Controversy Between Protestants and Roman Catholics* (1836); *The Christ of History* (1855), republished 1868 with an appendix on Renan's Life of Christ, and regarded as a very able work; *Evil and Good, the Mystery* (1856); *The Province of Reason* (1860), a criticism of Mansel's Bampton lectures on the *Limits of Religious Thought; The Life and Light of Men* (1866); and *The Creator and the Creation, how Related* (1870).

YOUNG, JOHN RUSSELL: American journalist: b. Downington, Pa., 1841, Nov. 20; d. Washington, D. C., 1899, Jan. 17. In 1857 he was copyholder on the Philadelphia *Press;* and later its news editor. At the outbreak of the civil war he became war correspondent, and was with the Army of the Potomac from the battle of Bull Run to the end of the Chickahominy campaign, when he returned to Philadelphia and became managing editor of the *Press.* In 1865 he joined the editorial staff of the New York *Tribune,* retiring in 1869; established the *Morning Post* in Philadelphia; and the *Standard* in New York (1869); and was European correspondent of the New York *Herald* (1871-7). As correspondent of that paper he accompanied General Grant in his journey round the world in 1877, and was attached to the editorial staff of the *Herald* 1879-82. He was minister to China 1882-5; and was appointed librarian of congress 1897, June 30. He published *Around the World With General Grant* (1879); *Memorial History of Philadelphia,* edited 1895.

YOUNG, JONATHAN: naval officer: 1825, Nov. 27—1885, May 17; b. in Ohio. Beginning as midshipman 1841, he was present in a conflict with privates off the coast of Cuba, and at the capture of a slave-ship. In 1845-48 he was on the ship of war *Columbus* in a voyage around the world, and was successful in delivering a letter to the then exclusive Japanese authorities. In 1855 he was promoted master and lieut., while cruising on the *Massachusetts* in the Pacific, and had part in fighting the Puget Sound Indians. After serving in the Paraguay expedition, and in the Mediterranean, he was present at the capture of the Hatteras and Port Royal works 1861; pursued the privateer *Sumter* to S. America and the Mediterranean; commanded the *Pembina* in the Gulf; was in charge of the Naval Observatory, Washington, and of the Portsmouth navy-yard, 1869-72; served in the Brazil and the Asiatic squadrons; and, having risen through various grades, was made commodore 1882.

YOUNG, Samuel Baldwin Marks: American general; b. Pittsburg, Pa., 1840, Jan. 9. He entered the Union army as a private in 1861; served with distinction through the civil war; and was brevetted brig.-gen. in 1865. Joining the regular army as 2d lieut. in 1866, May, he became col. in 1897; was commissioned brig.-gen. of vols. the next year, and participated in the Cuban campaign. He was promoted maj.-gen. of vols.; served in the Philippines in 1889-1901; was promoted maj.-gen. U. S. A., 1901, Feb. 2, and served as military governor of n.w. Luzon and was commander of the 1st dist., dept. of Luzon. In 1902, Feb., he was elected as the 1st pres. of the newly established Army War Coll., in Washington, D. C.

YOUNG, Thomas, m.d.: one of the most ingenious and original philosophers and one of the most learned linguists of the 19th c.: 1773, June 13—1829, May 10; b. Milverton, Somersetshire, England. His parents, Thomas and Sarah Young, were strict Quakers; and Young had the impression that the peculiar doctrines of the Quakers had a favorable influence on his character and career. In particular, he connected with the Quaker doctrine of divine suggestion the perseverance with which he followed up any pursuit in which he engaged, to which he, like Buffon, was disposed to attribute all the discoveries which his genius enabled him to make. Wonderful stories of his youthful precocity have been recorded, and they seem to have more truth than such stories usually have. In 1780 he was sent to a boarding-school at Stapleton, near Bristol, where he remained two years; he was afterward put to a school at Compton, in Dorsetshire. When he left Compton, in his 14th year, besides having a great knowledge, for his age, of Greek and Latin and of mathematics, he had learned French and Italian, and, without any tuition, had made considerable progress in Hebrew, Persic, and Arabic. In 1787 he went to live with David Barclay of Youngsbury, near Ware, in Hertfordshire, an eminent member of the Soc. of Friends, partly as the fellow-pupil, partly as the tutor, of that gentleman's grandson, Hudson Gurney. A Mr. Hodgkin was called in to assist the studies of the two lads, but Young soon proved to be superior in acquirements to his instructor, and virtually the three became fellow-students. Mr. Hodgkin published 1793 a work entitled *Calligraphia Græca,* which he dedicated to Young. Young continued with Mr. Barclay till 1792, spending the summer months in Hertfordshire, and the winter in London, studying Greek and Latin, the modern languages—the oriental and the European—the higher mathematics, and natural philosophy, and, by way of amusement, botany and zoology. He taught himself to write Latin with fluency and elegance, and to write Greek verses, which received the commendation of some of the best judges of the time. During the winters of

1790-1 he attended lectures on chemistry in London; but neither then nor at any subsequent time did he show much disposition toward experimenting: his bias seems to have been toward the pure rather than the observational sciences.

Toward the end of 1792 he began to study medicine; and he attended medical lectures for two years in the schools of London, and afterward for a year at the Univ. of Edinburgh. After going to Edinburgh, Young gave up the Quaker dress and the more inconvenient Quaker customs; he took lessons in music and dancing, mixed freely in society, and went occasionally to the theatre. These changes, though not intended to go further, eventually led to his complete estrangement from the Society of Friends. From Edinburgh he went to the German Univ. of Göttingen, from which, after nine months' residence, he got the degree M.D. He continued more than a year longer in Germany, and visited various medical schools, returning to England 1797, Feb. At that time the membership of the College of Physicians was restricted to graduates of Oxford and Cambridge; and to qualify himself for it, Young, on his return, entered as a fellow-commoner at Emmanuel College, Cambridge, at which he remained until he took his degree 1799. In 1800, having become a member of the College of Physicians, he took up his residence in London, and began to practice as a physician. He took the degree M.B. at Cambridge 1803, and M.D. 1807. His mother's uncle, Dr. Brocklesby, who died 1797, had left him £10,000, besides his house in London, with his furniture, library, and collection of pictures, so that he was in possession of a moderate competency.

In 1801 he was appointed prof. of natural philosophy in the Royal Institution, then newly established, and he began to deliver lectures early in the following year. As a lecturer he was not popular, his style being too condensed, and the matter of his lectures unsuited to the miscellaneous audiences of the Royal Institution. He published 1802 a *Syllabus of a Course of Lectures on Natural and Experimental Philosophy,* in which, among other things, he first announced his great discovery of the law of the Interference of Light, which by itself, as Sir John Herschel has remarked, would have procured him a scientific immortality. It was this discovery which first fairly turned the balance of evidence in favor of the undulatory as against the molecular theory of light. It is Young's most important contribution to science. He had been elected a fellow of the Royal Society as soon as he was 21; in 1802 he became its foreign secretary, a post which he retained till the end of his life. He resigned his professorship on his marriage 1804, fearing that his filling a chair of science might interfere with his success as a physician. The lectures which he delivered as prof. were the foundation of the *Course of Lectures on Natural and Mechanical Philos-*

ophy which he published 1807—a great work, embodying a complete system of natural and mechanical philosophy, on which he was engaged nearly five years. A new ed. of these lectures was published 1845, edited by Prof. Kelland of Edinburgh. Young's doctrine of Interference was at first unfavorably received by scientific men in England: it was attacked and ridiculed in the *Edinburgh Review;* and so little interest was taken in the subject, that of a pamphlet which Young published in answer to the *Edinburgh Review* only a single copy was sold. As has often happened, the first recognition of the importance and ingenuity of this and others of Young's speculations came from the scientific men of the continent.

Young was admitted a fellow of the College of Physicians 1808, and was elected one of the physicians of St. George's Hospital 1810. He afterward published several medical works, which, though they were little more than compilations, and are now forgotten, show that he was thoroughly versed in the history of diseases and of medical opinion. His hospital practice, too, is said to have been successful; but he had little success in getting patients. He retired from practice—retaining, however, his connection with St. George's Hospital—1818, on his appointment to be sec. of the Board of Longitude. On the dissolution of the Board of Longitude, he became sole conductor of the *Nautical Almanac;* and afterward, when the system of life insurance began to be popular, he held, with this post, the office of scientific adviser of a life insurance company. During the last years of his life he was a member of a council appointed to advise the admiralty in scientific matters.

Young's greatest achievement, after his great discovery of the law of Interference, was in connection with the subject of Hieroglyphics (q.v.). He was the first to hit on the process of investigation by means of which the received interpretation of hieroglyphics has been arrived at. His discovery was published originally in papers written for the Soc. of Literature, afterward in the *Encyclopædia Britannica,* and in a book 1823. In his later years much of his attention was given to this and cognate subjects. He was engaged on an Egyptian dictionary at the time of his death. His miscellaneous writings, contributions to Transactions of learned and scientific bodies, to reviews, and to the *Encyclopædia Britannica,* were very numerous. Three volumes of them, two consisting of Scientific Papers, ed. by Dean Peacock, the third of Hieroglyphical Essays and Correspondence, ed. by John Leitch, were published 1855.

He died after several months of failing health. His character seems to have been singularly amiable, and to have endeared him to a multitude of friends, by one of whom, Dr. Peacock, dean of Ely, an ample biography of him was published 1855. Young was, two years before

his death, elected a foreign associate of the Acad. of Sciences at Paris, succeeding to the illustrious Volta.

YOUNG ENGLAND: in *Eng. hist.*, a small party of young aristocrats, of fashionable tastes, who, during the early manhood of Disraeli, afterward Lord Beaconsfield, sought to model England according to their conservative views. It soon passed away, and the name fell into disuse.

YOUNG GERMANY: a group of literary and political innovators in Germany, headed by Heine (q.v.).

YOUNG IRELAND: the name applied to a company of Irish agitators, who were active between 1840 and 1850. They at first adhered to O'Connell, but soon became very radical in their opinions and separated from the conservative Irish politicians in 1844. *The Nation* was their political organ and in this journal the Irish people were constantly incited to revolt. In 1848 John Mitchell, one of the leaders of the party, was arrested and sent to Tasmania, and the attempted insurrection which followed soon collapsed, two of the leaders, T. F. Meagher and W. S. O'Brien, being sentenced to death, but their sentences were presently commuted to transportation.

YOUNG ITALY: a society of Italian republicans formed by Giuseppe Mazzini in 1831, whose aims were the emancipation of the Italian peninsula from the control of Austria, and the union of the various portions of the country under a republican rule. Its greatest activity was in 1834, when Mazzini led an unsuccessful invasion of Savoy. The influence of the society soon declined, but it was of service in arousing Italian patriotism and it formed the model for similar organizations elsewhere in Europe, such as Young France, Young Germany, etc.

YOUNG MEN'S CHRISTIAN ASSOCIATIONS: organizations for religious and other benefits, and for Christian work. The movement for their formation dates from 1844 in London, and somewhat later in this country. But there were earlier associations with similar aims. In 1632 there was one of apprentices in London, for spiritual exercises, meeting before church-time on the Lord's Day. About 1668 some young men in the English Church were organized, under clerical guidance, for religious improvement and charitable work; and from this grew other societies, besides many in the reign of Charles II. and James II., not confined apparently to young men, and most prosperous in the reign of William and Mary. (See *Hist. of Religious Societies in the City of London*, by Josiah Woodward, D.D., 1700.) In 1710 the Rev. Cotton Mather, of Boston, in his *Essays to do Good*, addressed certain societies under the title 'Young Men Associated,' and says, 'These, duly managed, have been incomparable nurseries for the churches.' John

Wesley and his friends, while students in the university, formed a religious association. From the societies mentioned by Dr. Woodward sprang many also 'for the Reformation of Manners,' i.e., the suppression of vice. In 1838 David Nasmith, founder of the London City Mission, wrote: 'Since the close of the year 1823, the privilege has been granted me of forming about 70 Young Men's Societies in the United Kingdom, France, and America;' the members were those 'professing no opinions subversive of evangelical principles,' and the object was 'mutual improvement and benevolent exertion;' the name was afterward changed to Christian Young Men's Union. In Cincinnati, 1848, Oct. 14, was formed a young men's organization which soon took the name Society for Religious Inquiry.

The direct origin of the present widely extended associations is traced to George Williams, of London, who, when a clerk, 16 years of age, united as many as he could of his 80 fellow-clerks for prayer and Bible study, in 1844; and with others decided to organize a Young Men's Christian Assoc., June 6. In America the first assoc. on the London basis was at Montreal, 1851, Nov. 25; and the first in the United States was organized in Boston, 1851, Dec. 29. In two years 26 had been formed; and in 1854 the first general convention was held, and the N. American confederation of the associations was formed, which continued until 1863, since which the annual convention and its central committee, named in 1879 the international, with permanent offices in New York after 1866, have been the bond of union. A special convention 1861 formed the U. S. Christian Commission for beneficent work in the war. The *Young Men's Magazine*, as organ, was published 1857-59. The convention of 1866 recommended the second Lord's Day in Nov. every year as a day of prayer for the associations, the institution of state and provincial conventions, and the publication of a quarterly journal (changed to the *Association Monthly* 1869). The Railroad Branch of the work originated Cleveland, O., 1872-3, but the first separate organization is tabulated 'New York G. C. Station, 1875.' Its magnificent building, near the Grand Central station, was the gift of Cornelius Vanderbilt. The college organizations began independently in the universities of Michigan and Virginia 1857-8; the German in Allegheny, Penn., 1871, though this work was begun in St. Louis 1870; that of colored people in Central Tennessee College 1875; the Indian associations are not dated. The latest period of association history has also been marked by a great extension in the work for different classes of young men. In 1895, Aug., the world's student Christian federation of under-graduates of all lands was established. This now enrolls 65,000 members, in 1,400 institutions, in 30 different countries, and is the largest organization among undergraduates in the world. In the United States and Canada the movement

has been extended to professional schools, theological seminaries, state universities, and other institutions of learning. There are now 716 college associations upon this continent, enrolling 44,500 students. Thirty American student associations own buildings valued at $1,000,000. There are now 98 student secretaries devoting their whole time to this work.

The work for railroad men has become one of the most remarkable features of Christian endeavor. Railroad corporations which control three-fourths of the railroad mileage on this continent contributed last year over $200,000 toward the current expenses of the railroad associations now in existence. There are 122 buildings, valued at $1,829,500, occupied by these associations, with a membership of 62,300, a gain of 30,000 in three years. There are 301 secretaries engaged in this department.

Since 1879 the international committee has employed a secretary to develop the work among colored young men. There are to-day 40 Indian associations, with 1,600 members, under the direction of a traveling secretary, who is a native American Indian.

Largely as an outgrowth of the work for students in other lands, the American international committee was invited by missionaries in India to inaugurate a work among young men in non-Christian lands. This work has always been carried on in subordination to the Church, and as a supplementary work where missions have already been developed. There are now 37 secretaries of the American international committee in India, Ceylon, Japan, China, and Brazil.

With the outbreak of the war with Spain, secretaries were sent out with tents and suitable equipments, and a successful effort was undertaken to preach the gospel to the soldiers and sailors. The army in the Philippines was provided for in a similar way, and some of the Canadian regiments sent to South Africa were equipped in like manner. This work has been established as a permanent department of the international committee. There are now 269 army posts at which work is being done. Seventy-five tons of equipment in 1903 were shipped to Alaska, China, Philippine Islands, Cuba, Porto Rico, and to different parts of the United States. Three army buildings have been erected.

Even before the Spanish war began steps had been taken to inaugurate a work among the seamen of the navy, and after the war a building was equipped for seamen at the Brooklyn navy-yard. This dept. has developed rapidly, and at the present time there is an organized movement among the seamen of the navy, which is full of promise. Through the munificence of Miss Helen Millar Gould, who has contributed largely toward the railroad and army work, a splendid building has been erected for the Naval Association, near the navy-yard in Brooklyn, at a cost of $150,000. Work is now being done

at two other home ports, and on a large scale. There are 27 secretaries in the army and navy associations of the United States.

For many years the work of the associations was limited to young men between 16 to 17 years of age, and upward. It is an interesting sociological development that, in the prosecuting of its work for young men, the association has been led to give its attention to work among boys. Careful study led to the conviction that effort ought to begin at the age when the boy is becoming a man—at the dawn of adolescence. There are almost as many boys in cities between the ages of 12 and 17 as there are young men. The first boys' dept. was organized at Salem, in 1869, but it is only in recent years that a determined effort has been made to organize a work among boys. In 1890 there were four secretaries giving their time to this department. In 1895 this number had increased to 17, and in 1903 to 107. Five hundred and seventy-six associations have either branches or departments for work among boys. The most unique feature of this dept. is what is known as the boys' camp, which was first developed by the Young Men's Christian Association, and is already a large factor in Christian work. One of the most important developments of recent years has been the extension of the association among men engaged in industrial pursuits. The associations were originally for commercial young men. Afterwards associations were organized for students, and later for railroad men. The city associations in recent years have been attracting large numbers of skilled mechanics to their membership, and today in the eastern associations, 35 per cent of the members belong to this class. Industrial associations existed in 1897 in connection with the Johnson Steel Plant at Lorain, Ohio, and an association building at a cost of $25,000 was erected for the use of the workingmen. Similar associations have been erected at Proctor, Vt.; Wilmerding, Pa.; Stampo, Ark.; Douglas, Alaska; Cananea, Mexico, and at several other places. An extensive work is also done among the miners in Pennsylvania and the lumbermen in several northern states. In 1902 the Brooklyn Young Men's Christian Association employed a secretary for the organizing of association work among the street railway employees of that city. They now have a building erected at a cost of $30,000. This is a club house with reading room, library, educational class rooms, auditorium, gymnasium, game room with pool and billiards, also bowling alleys, baths, etc. Similar departments have been organized in a number of other cities.

The industrial revolution which attracted the young men to the city, and so created the basis for the Young Men's Christian Association, has to a large extent depleted the rural districts of young men. At the same time it still remains true that a majority of young men

are found in the country. There are 8,000,000 young men in the country districts of the United States and Canada. For many years an effort was made to discover some method of carrying on association work among these men. What is known as the county work has proved so successful that in 10 different states there are now county organizations, the most extensive work being carried on in Kentucky, where eight county secretaries are employed. The plan of work is a county committee, which employs a traveling secretary who will supervise and stimulate Christian work among the young men in the county, organizing Bible classes, men's meetings, in many cases establishing reading rooms, social parlors, sometimes educational classes, and in a few instances organizing clubs for athletics of various kinds. County conventions are held, deputation Sundays, and a carefully systematized effort is made through the entire county.

Whether the Young Men's Christian Association has reached its final form, no one would be bold enough to affirm. It is remarkable that it should have grouped together such a variety of agencies upon the simple platform of young men advancing the Kingdom of Christ among young men. Through the three periods of its development, the association has evolved into an institution with an enlarged ideal, closely akin to that of the Christian university. It is still animated by the evangelistic, spiritual purpose of the original band of young men who rallied around George Williams 60 years ago. But, while keeping uppermost this ideal, it has endeavored to do, in a popular way, for the multitudes of young men of our cities, what the Christian university, in a more scholarly way, is doing for the young men who are to enter the professions. There is every evidence that the association has only begun its career of usefulness, and that in the future it will become a manifold more important factor than in the past.

In 1908 there were 7,942 associations in the world, of which 1,939, with 446,032 members, were in America. These associations owned 630 buildings worth nearly $40,000,000, and had libraries containing nearly 600,000 volumes; their students numbered about 44,000, and the physical depts. had 187,000 members. The year's current expenses were $6,992,294.

YOUNG PEOPLE'S CHRISTIAN UNION: an organization in the United Brethren Church, founded 1890, June 5. It is a union of all forms of young people's societies within the church, uniting them for the purpose of denominational direction. There are now (1908) in this union 2,215 societies, of which 575 are junior societies. The total membership is 83,652.

YOUNG PEOPLE'S SOCIETY OF CHRISTIAN ENDEAVOR. See CHRISTIAN ENDEAVOR, YOUNG PEOPLE'S SOCIETY OF.

YOUNG PRETENDER, The: a title applied to Charles Edward Stuart, son of the Pretender. He was defeated by the Duke of Cumberland at Culloden 1746, Apr. 16.

YOUNG'HUSBAND, George John, English soldier. He entered the British army in 1878, and was promoted successively lieut. 1880, capt. 1889, maj. 1896, and lieut.-col. 1900. He served in the Afghan war in 1878-80, in the Sudan in 1885, on the n.w. Indian frontier in 1886, and in the Burmese expedition of 1886-7. In 1895 he was a member of the Chitral relief force, and in 1898 was detailed to accompany the American forces in the Spanish-American war and the subsequent campaign against the Philippine insurgents. He fought in the second Boer war in S. Africa (1899-1902), and was severely wounded. Subsequently he was assigned to the Indian staff corps, and in 1904 was the leader of a British diplomatic mission to Tibet which aroused considerable discussion by its unwarranted assumption of the character of a punitive expedition.

YOUNGSTOWN: city of Mahoning co., O.; on the Mahoning river; and on the Erie, the Lake Shore and Michigan Southern, the Pennsylvania, the Pittsburg & Western, and the Pittsburg & Lake Erie railroads; 65 m. s.e. of Cleveland, 68 m. n.w. of Pittsburg. It is an agricultural region, and is also the centre of the Ohio block coal basin. The city has natural and manufactured gas and electric lighting plants; efficient water, sewerage, fire, police, telegraph, and telephone services; electric street railway; 56 churches, several national banks and private bank; and daily, weekly and monthly periodicals. Youngstown is noted for its coal and iron interests and for various industries connected therewith. The manufactures, employing more than $6,000,000 capital and 7,000 hands, and yielding annual products of about $10,000,000, include mercantile iron, steam-engines and boilers, foundry and machine-shop products, pig-iron, wrought-iron pipes, iron fencing, flour, sashes, blinds, doors, scales, ale, beer, bolts, nuts, stoves, carriages, and tinware. Pop. (1900) 44,885; (1910) 79,066.

YOUNG TURKS: the name applied to the reform party that forced the Sultan to grant the constitution of 1908, and which continues the agitation for political freedom and progress.

YOUNG WOMEN'S CHRISTIAN ASSOCIATION, The World's: has headquarters in London, and embraces organized associations in the following countries: Great Britain, Canada, the United States, Denmark, Norway, Sweden, Finland, France, Germany, Hungary, Italy, and India. Many of these countries hold national conventions and issue national organs.

The affiliated body in the United States is known as the American Committee, organized in 1886. Its headquarters are in Chicago. At the present time there are

connected with the American Committee 24 state associations, embracing organized work in nearly every state in the Union and employing 28 state secretaries. There are affiliated with the American Committee 93 city associations and 10 branch associations in six cities. Three of the 93 city associations are gospel settlements for women. The total active membership of the city associations is 50,638. For the past year 306 Bible classes, 434 physical training classes, 675 educational classes, 227 domestic science, and 225 domestic art classes are reported; 52 associations conduct lunch rooms for women, 35 conduct boarding homes. There are also employment bureaus, travelers' aid work, summer homes, and religious meetings maintained. In 227 factories association workers carry on meetings and clubs for young women.

There are 501 student associations affiliated with the American Committee, with a total membership of 35,181; 269 of these have rooms or buildings, all hold regular religious meetings and missionary meetings. They enroll 4,756 young women in mission classes, and 10,567 students in regular study of the Bible.

The American Committee conducts four summer conferences, attended the last season by 2,026 persons. A training institute for secretaries is conducted in Chicago, and a monthly periodical, the *Evangel*, is maintained as the national organ.

The International Board of Women's and Young Women's Christian Associations embraces 54 associations in various cities throughout the United States. Of these 40 report boarding homes, 14 report vacation homes, 37 report libraries, 20 report women's restaurants, 27 report educational classes, 26 report domestic science and art, 21 report physical classes, 15 have travelers' aid work, 26 have employment departments, 27 maintain work of city relief, hospital, rescue work, homes for the aged and incurables, orphans' home and maternity work, 15 conduct women's exchanges.

YOUR, pron. plu. *yôr,* or YOURS, *yôrz* [AS *eower,* of you, your—originally gen. of *ge,* ye] : the possessive plu. of *thou;* belonging to you. YOUR is used when prefixed to a noun or adjective, as, 'this is *your* book;' and YOURS when the noun goes before, or is understood, as 'this book is yours.' YOURSELF', pron. *-sĕlf',* plu. YOURSELVES', *-sĕlvz'* [*your,* and *self*]: an emphatic or reflexive form of *you;* as, behave *yourselves;* this is intended for *yourself* you *yourselves* know.

YOURT, n. *yôrt:* a Mongol tent or encampment.

YOUTH, n. *yôth* [from YOUNG, which see]: the part or period of life which extends from puberty to full growth, but in a wider sense the whole early part of life; a young person; especially, a young man; collectively, young persons; the condition of being young; youngness; freshness, as, she retains her *youth.* YOUTHS,

n. plu. *yôthz,* young persons; young men. YOUTHFUL, a. *yôth'fûl,* pertaining to the early part of life; young; suitable to the first part of life; fresh; vigorous, as in youth. YOUTH'FULLY, ad. *-lĭ.* YOUTH'FULNESS, n. *-nĕs,* the quality of being youthful.

YPRES, *ē'pr,* or YPEREN, *ī'pĕrn:* town of Belgium, formerly fortified, province of West Flanders; in a fertile plain on both sides of the Yperlee, about 29 m. s.s.w. of Bruges. The marshes around the town formerly rendered it very unhealthful, but considerable improvement has been effected by drainage. Ypres was one of the most important manufacturing towns in Flanders, being said to have had in the 14th c. a pop. of 200,000, and 4,000 looms. Its staple manufacture consisted of the cloth called, according to some, after the name of the town, Diaper; though this derivation must now be given up. The only remnant of its flourishing manufacture is the Cloth-hall (*Les Halles*), in the great market-place, a building of prodigious size, in the form of a trapezium, in a rich style of Gothic architecture, and surmounted by a stately square tower or belfry, with a clock and chimes. It was begun 1230, and continued till 1342; the e. end, supported on pillars, being added 1730. One of the wings is now used as the *hôtel-de-ville,* and other parts are occupied by different public establishments, and concert-rooms. The Cathedral of St. Martin is a fine Gothic edifice, with an altar of Carrara marble, a richly carved pulpit, and a picture doubtfully attributed to Van Eyck. Other buildings are the churches of St. Peter, St. James, and St. Nicolas, the old castle-ward, two colleges, several hospitals, barracks, numerous boarding and day schools, etc. The chief modern manufactures are thread, lace, linens, woolens, cottons, silk, ribbons, leather, oil, soap, tobacco. There are many tanneries, oil-mills, salt-works, dye-works, breweries. The town is connected with the Yser by canal, and is a station on the W. Flanders railway. Pop. (1890) 16,505; (1900) 16,552.

Ypres is ancient, its origin dating from the 9th and 10th centuries. In 1688 it was strongly fortified by Louis XIV., and in the great European wars was frequently subject to sieges.

YPRES-LACE, n. *ē'pr-lās:* the finest and most expensive kind of Valenciennes lace, made at Ypres in Belgium.

YPSILANTI, Mich.: city in Washtenaw co.; on the Huron river, and on the Lake Shore and Michigan Southern, and the Michigan Central railroads; 30 m. w. of Detroit and 8 m. s.e. of Ann Arbor. It is on both sides of the river. In 1807 there was an Indian trading-post on the site of the present city. In 1824 it was laid out as a town, became a village in 1832, and was chartered as a city in 1858. It has considerable manufacturing interests. In 1900 (government census) the total capitalization of the manufacturing establishments in the city

was $898,161; the value of the annual products was $1,318,793. The chief manufactures are flour, paper, dairy products, underwear, agricultural implements, sash, door and blinds, tags and labels, pumps, cement and foundry and machine shop products. The city is the commercial centre of a rich surrounding country. It contains 9 churches, and the Michigan State Normal College, a high school established in 1849, a business college, public elementary schools, kindergartens, and public and school libraries. The two banks have a combined capital of $125,000. The city owns and operates the electric-light plant and the waterworks. The government is administered under a charter of 1898, and is vested in a mayor, who holds office one year, and a common council of 10 members. Pop. (1900) 7,378; (1910) 6,320.

YPSILANTI, *īp-sē-lân'tē:* Fanariot family, for which is fallaciously claimed a descent from the imperial stock of the Comneni; and which has furnished various champions of the Christian population under Turkish rule.—The first of these, Prince CONSTANTINE YPSILANTI (1760-1816, b. Constantinople), for his translation of the works of Vauban, was raised to high official rank by Sultan Selim III., and was subsequently appointed hospodar of Moldavia 1799, and of Walachia 1802. His administration in these provinces was marked by wisdom and energy; but his ill-concealed sympathies with Russia led (1806) to his dismissal and flight to Transylvania. Re-established in the government of Walachia by the Russians, he showed his hatred for the Porte by inciting (1807) the Servians to insurrection; but soon finding that his allies, the Russians, had views and aims quite inconsistent with his, and unable to strive with both Russians and Turks, he took the oath of allegiance to the czar, and retired to Kiev, where he died. He left numerous works, in Italian, French, and Turkish.

His three sons, Alexander Ypsilanti, Demetrius Ypsilanti, and Nicolas Ypsilanti, followed the same policy.—The eldest, ALEXANDER (1783-1828), served in the Russian army, and was chosen by the 'Hetairists' as their chief 1820. In promotion of the cause of Rouman independence, he collected a large sum by subscription in Russia, and afterward, invading Moldavia, raised an insurrection in both principalities. But, little suited by natural gifts to guide the movement that he had originated, he was attacked by the Turks near Galatz, totally defeated, and forced to take refuge in Austria, where he was arrested and imprisoned. Released after a time, but broken in spirit by chagrin and privations, he retired to Vienna, where he died.—The next younger son, DEMETRIUS (1793-1832), began his career in the Russian army, and joined his brother in his schemes for emancipating from servitude the Christian population of Turkey. Sent to Greece, armed with powers from his brother, he took a glorious part in the capture of Tripo-

litza (1820, Oct.), but was less successful in the following year in his attack on Eubœa. His gallant defense of Argos against the Turks stopped the victorious march of the latter, and gained (1823) for him the honorary titles President of Argos, Prince of the Peloponnesus, President of the Legislative Council, and Senator. His stubborn resistance (1825) to the victorious Ibrahim at Napoli was another valuable service to Greece. In 1827 the grateful Hellenes made him commander-in-chief of their forces; but some difference arising between him and the president, Capo d'Istria, he resigned his post 1830, Jan. He died at Napoli di Romania. Ypsilanti was insignificant in appearance, but had the soul of a hero; and was as deaf to the allurements of pleasure as to the promptings of ambition.

YREKA, Cal.: city, county-seat of Siskiyou co.; on the Yreka creek, and on the Yreka railroad; about 355 m. n. of San Francisco. It is in an agricultural and lumbering region, in which considerable attention is given to fruit cultivation and stock-raising. There are large stock yards, a lumber mill, and fruit-packing houses. The city has one bank with a capital of $100,000, and a county high school. Pop. 1,200.

YRIARTE, or Iriarte, Tomas de: Spanish dramatist: b. Orotava, island of Teneriffe, 1750, Sept. 18; d. Madrid 1791, Sept. 17. He began to write in boyhood and in 1770 published his comedy, *Hacer que hacermos,* under the pseudonym, 'Tirso Ymareta.' In 1780 he published a didactic poem, *La musica,* and in 1782 *Fabulas literarias,* considered the best fables in the Spanish language. He also wrote the first regular comedies in Spanish, the best being *The Spoiled Child* and *The Ill-Bred Young Lady* (1788), and published Spanish translations of French plays, Horace's *Ars Poetica* (1777), and four books of the *Aeneid.* In 1771 he succeeded his uncle, Juan de Yriarte as royal librarian.

YSLETA, Texas: city in El Paso co.; on the Rio Grande, and on the Texas and Pacific, and the Southern Pacific railroads; 12 m. e. of El Paso. It is in a fertile agricultural region, the productive Rio Grande valley, in which fruit and grains grow in abundance. In 1540 Coronado discovered here a village of Pueblo Indians. He founded here a colony, erected a church and provided teachers for the Indians. The city claims to be the oldest in the state. Several of the descendants of the Pueblos are residents of the city. Pop. 1,700.

YPSIPETES, n. *ĭp-sĭp'ĕ-tēz* [Gr. *hupsipetēs,* high-flying; *hupsi,* high; *petomai,* to fly]: in *entom.,* a genus of moths of the family *Larentidæ.*

YSSEL, or Ijssel, *ĭs'ĕl:* river of the Netherlands, formed by the junction at Doesburg, in Gueldres, of the Oude (*Old*) Yssel from Westphalia and the New Yssel, an offset of the Rhine, cut about B.C. 10 by the Roman

general Drusus. After this it flows n. and then n.w. past Zutphen and Deventer, forming part of the boundary between Gueldres and Oberyssel, and, passing Kampen, falls into the Zuider Zee, after a course of about 80 m., forming at its mouth a delta, which is gradually increasing. The principal affluents are the Borket, the Schipbeek, and the Grift.—There is another river of the same name, branch of the Rhine, in the province of Utrecht.

YTHAND. See EIDENT.

YTTERBIUM, *ĭt-tėr'bĭ-ŭm* (sym. Yb, at. wt. 172.5 [?]): an element discovered in Gadolinite, but of which little is known.

YTTRIA, n. *ĭt'rĭ-a* [from *Ytterby*, in Sweden, where first found, 1794]: sesquioxide of Yttrium; a soft nearly white powder (Y_2O_3), which when ignited glows with a pure white light. According to Mosander, three bases have been confounded under the single name Yttria; to the most abundant of these he gives the name Yttria, while he distinguishes the others as *erbia* and *terbia*. YTTRO-, *ĭt'rō*, a prefix signifying that the compound contains *yttria* as a constituent. YT'TRIOUS, a. *-ŭs*, pert. to or containing *yttria*.

YTTRIUM, *ĭt'trĭ-ŭm* (sym. Y, at. wt. 89): very rare metal, found in Gadolinite, in *yttrotantalite*, and in one or two other very scarce minerals. Neither the metal, the oxide (yttria), nor the salts of the oxide, are of practical importance. YT'TRIUM-GAR'NET, a variety of garnet occurring in Norway, containing, according to Bergemann, sometimes as much as 666 per cent of yttria.

YTTROCERITE, n. *ĭt-trō-sēr'īt* [prefix *yttro-*; Eng. *cerite*]: mineral occurring, associated with albite and topaz, at various places near Fahlun, Sweden; lately found in a few localities in the United States. Its hardness is 4 to 5; sp. gr., 3.447; lustre, vitreous to pearly; color, violet-blue shading to white; comp., variable, consisting of the fluorides of calcium, cerium, and yttrium.

YU, or YUH, n. *yü* [Chinese]: a species of nephrite, highly prized by the Chinese, especially the green and white kind called *fei-tsui*, or 'kingfisher-plumes': it is used for vases, bracelets, rings, etc. *Yu* is jadeite, but is usually called jade.

YUBA: a river in California, formed by the junction of three rivers, North, Middle, and South, which have their sources in the Sierra Nevada. The Yuba enters the Feather river just below Yuba City. In its upper course it has many picturesque gorges, and several cascades.

YUBA CITY, Cal.: town, county-seat of Sutter co.; on the Feather river, near the mouth of the Yuba river, and on the Southern Pacific railroad; about 40 m. n. of Sacramento. It is in a fertile agricultural region, in which fruits are among the important productions. The industries are chiefly connected with farm products. The

town has one bank, Farmers' Co-operative Union of Sutter County, with a capital of $50,000. Pop. (est.) 1,500.

YUCATAN, *yū-kâ-tân':* region in the s.e. extremity of Mexico; consisting of two confederated states, Campeachy (Campeche) in the w. and Yucatan in the e.; forming a peninsula between the Gulf of Mexico and the Caribbean Sea; 280 m. long, 200 m. in average breadth, 700 m. of coast-line; 55,400 sq.m. (Yucatan, 29,570 sq.m., cap. Merida—q.v.; Campeachy 25,830 sq.m., cap. Campeachy—q.v.). The extreme n.e. point extends to within 120 m. of Cuba. The surface is largely a tableland. The climate is hot, with deficient rainfall, but is not unhealthful, except that the region is subject to periodical visits of yellow fever. The soil is calcareous and porous; and little is seen of the ancient fertility which must have characterized this region when it was the seat of a flourishing civilization, with populous cities of great size and splendor. Only a small portion of the country is under tillage, and the general appearance is that of a wilderness. Vastly different was the scene at the time of the Spanish conquest 1527-47, 'as revealed by the innumerable remains of towns, cities, temples, palaces, and other public buildings dotted over the plateau, especially round the now desolate n. and n.e. shore of the peninsula.' The vast ruins are the mysterious monumental remains of the Maya nation, whom the Spanish found here, and whose descendants constitute five-sixths of the present population. There is no evidence for the great antiquity (1,700-2,000 years) formerly assigned to the ruined structures in Yucatan; yet they are considered to antedate the southward Toltec migration—some of the cities having been forgotten ruins at the time of the Spanish conquest. Pop. (1900) Yucatan 312,264.

YUCCA, *yŭk'ka:* genus of plants of nat. order *Liliaceæ*, natives of North America, and some of which are often cultivated in gardens for the singularity and splendor of their appearance. *Y. gloriosa*, the so-called Dwarf Palmetto or Mound Lily, is a native of the s. parts of North America. It has a stem about 2 or 3 ft. high, whose upper part produces a great tuft or crown of large sword-shaped evergreen leaves, each terminating in a sharp black spine. From the centre of this crown of leaves arises the flower-stalk, 3 ft. or upward in height, branching out on every side and forming a great panicle. The flowers are bell-shaped and drooping, white with a purple stripe on the outside of each segment of the perianth. The fibres of the leaves are used by the American Indians to make a sort of cloth and cordage, and are used by Mexicans for ropes and packing.—The other species have a general resemblance to this in habit and appearance. *Y. brevifolia* of the s. Rocky Mountains, the Joshua Tree, grows to 40 ft., and in places like a forest. *Y.*

angustifolia extends n. to the Dakotas. Other southern species are *Y. filamentosa*, a common and showy plant cultivated in northern gardens, and named from the thread-like fibres on the edges of the leaves; and *Y. aloifolia*. Both are sometimes called Adam's, or Eve's, Needle and Thread. The latter is named also Spanish Dagger. The Spanish Bayonet is the name given to several Mexican species, one of them, *Y. constricta*, extending to Texas and Utah; another is the so-termed Mexican Banana, edible. The fibre of the *Yuccas* is similar to that of the *Agaves* and *Bromelias*, and probably is often included under the name *Pita Flax* or *Pita Fibre*.

YUDHISHT HIRA. See PÂN'D'AVAS.

YUFTS, n. *yŭfts* [Russ. yuft]: a kind of Russian leather, which, when well prepared, is of good red color, soft and pleasant to the touch, with an agreeable, peculiar odor.

YUGA, or YOOGA: one of the periods into which the past history of the globe is divided in the chronology of the Hindus. There are four yugas: the Satya Yuga, containing 1,728,000 years; the Treta Yuga, 1,296,000; the Dwapara Yuga, 864,000 years; and the Kali Yuga, now in progress, which began about 3094 B.C., and which will extend 432,000 years. Horace Hayman Wilson points out that these numbers originate in the descending arithmetical progressions of 4, 3, 2, 1, according to the notions of diminishing virtue in several ages applied to a cycle of 12,000 divine years, each equal to 360 years of mortals; and $12{,}000 \times 360 = 4{,}320{,}000$, the periods of the four yugas added together.

YUIT: the Eskimos of extreme n.e. Asia, from East Cape to a little beyond Plover Bay. They migrated from America probably in recent times, and in appearance, customs, and manners differ in no great degree from their Alaskan kinsmen. Their population is unknown.

YUKIAN: (adjectival form of the Wintun *yuki*, 'stranger,' also 'bad,' 'thieving'), a linguistic stock of North American Indians, consisting chiefly of the Ashochimi, Chumaya, Napa, Tatu, and Yuki tribes, which formerly occupied Round valley and the area extending therefrom to the California coast. The Round Valley reservation was subsequently established to receive these and other tribes, and most of their representatives now reside thereon. The entire group numbers only a few hundred at most. The original home of the Ashochimi was near the present Healdsburg; the Chumaya occupied middle Eel river; the Napa, upper Napa valley; the Tatu, Potter valley; and the Yuki, Round valley.

YUKON: North America, a large river, mainly in the United States territory of Alaska, which rises as the Lewes in British Columbia, about lat. 59°, and after a tortuous north, west by south, and northwest course of 2,044 m., flows into Bering Sea, on the southern shore

of Norton Sound, through a many-channeled delta from 80 to 90 m. wide. The northernmost channel of the delta, the Aphoon Mouth, is the only one navigable. The main stream of the Yukon is formed at Fort Selkirk in 63°, by the junction of the Lewes and the Pelly, the former being constituted by the junction of the Big Salmon and Teslin flowing from Teslin Lake and draining a group of small lakes in the region around Mounts Landsowne and Lorne. From Fort Selkirk the Yukon flows northwest with many windings, passing through the Klondike gold-field, receiving from the right the Stewart river, and at Dawson the Klondike, and from the left the White river, Sixty-Mile creek, and Forty-Mile creek. It enters Alaska in about 65° n., and continues its northwestern course until the Arctic circle is reached, when, at the abandoned Fort Yukon, it is joined on the right by the Porcupine river, bends suddenly, almost at right angles, and thenceforward has a general southwestern trend to its mouth.

The chief Alaskan tributaries of the Yukon are the Kozukuk on the right bank, and the Birch and Tanana on the left bank. Its whole course of 1,260 m. through Alaska is navigable by stern-wheel steamers, and beyond to Dawson in Canada; since the discovery of gold throughout the region in 1897 a regular summer service is maintained; the first impracticable obstruction to navigation is at the Grand Cañon, 1,866 m. from the mouth. In its lower course the Yukon is a broad, muddy stream flowing mostly through a marshy plain and for nearly nine months of the year, from October to June, frozen over; its upper course is through the grand scenery of narrow mountain valleys, and rocky gorges. The Yukon is the largest American river flowing into the Pacific; it is the seventeenth river of the world as to length. the seventh of the western hemipshere, the fourth of the North American continent, and the third in the United States. This last assertion is based on its whole length of 2,044 m., however, but taking only that portion which is in the United States, or Alaska, 1,260; it is the fifth river of our country, the Mississippi, Missouri, Arkansas, and Ohio rivers being longer. Its length in navigable miles is 2,036, there being but four rivers in the world with a greater capacity, the Amazon, the Mississippi, the Missouri, and the St. Lawrence.

YUKON: the Yukon territory is the most northwesterly of the political divisions of the Dominion of Canada. It embraces a large, roughly triangular area of country, measuring about 207,000 sq.m., bounded on the south by British Columbia, on the west by Alaska, on the north by the Arctic Ocean, and on the northeast by the series of mountain ranges separating the Yukon and Mackenzie basins. The population in 1905 was about 8,000.

Topography.—The territory includes a mountainous belt on the northeast consisting of the Selwyn, Ogilvie,

and Peel river ranges of mountains, all of which are usually classed in the Rocky Mountain system, and the great St. Elias range on the southwest. A number of peaks in the latter range, such as Mount St. Elias and Mount Logan, exceed 18,000 ft. in height. The central part of the territory is a broken upland known as the Yukon plateau, a great tract of rolling country deeply trenched in all directions by the wide valleys of the present and preglacial drainage systems. Toward the Arctic Ocean the plateau is replaced by a plain sloping easily down to sea-level.

The greater part of the Yukon territory is drained by the Yukon river, the fourth largest river on the North American continent and one of the great rivers of the world. The Yukon is formed by the junction of the Lewes and Pelly, the former drawing most of its waters from the Coast range and the latter from the mountains of the Rocky Mountain system. Other large tributaries of the upper Yukon are White river, a swift, turbid stream heading in the glaciers of the St. Elias range, and the Stewart and Porcupine rivers, both of which enter it from the east. River steamers navigate the Yukon river throughout its whole length and also ascend the Lewes up to Whitehorse rapids, a total distance from tide-water of about 2,000 m. The Pelly, Stewart and other tributaries are also navigable for some hundreds of miles above their junctions with the main stream.

Fauna and Flora.—The valley flats and the lower slopes of the hills and ridges throughout the territory are more or less thickly forested, while the uplands are bare. In the southern part of the territory the forest ceases at an elevation of 4,000 ft. above the sea. Going northward the tree line descends gradually and at the Arctic circle has an elevation of less than 2,000 ft. above the sea. The principal forest trees are the white and black spruces (*Picea alba* and *P. nigra*), the aspen (*Populus tremuloides*), the balsam poplar (*Populus balsamifera*), the balsam fir (*Abies subalpina*), the black pine (*Pinus Murrayana*), and the birch (*Betula papyrifera*).

The larger animals of the district include the black and brown bear, the woodland and barren land caribou, the moose, at least two species of mountain sheep, the mountain goat, the timber wolf, the red fox, the wolverine, lynx, and martin.

Climate.—The climate is severe. The winter season lasts from about the 1st of November until April. The rivers are usually frozen by the 1st of November and remain frozen until May, while the lakes are seldom free from ice before the 1st of June. During the winter season thaws are infrequent and the temperature usually ranges from zero to 40° F. below. Occasional dips to 60° F. below and one to 68.50° F. below have been recorded. The low temperatures are usually accompanied by a dry atmosphere and do not occasion much hardship. The

summer season, lasting from the middle of May to the middle of September, is exceedingly pleasant, as the long clear days are never oppressively hot and the nights are always cool. The rainfall is light, the annual precipitation amounting to about 15 in.

Gold Mining.—The first gold seeker entered the country by the Chilkoot pass, through the Coast range, in 1873. In 1881, bar-mining commenced on the Big Salmon river, and discoveries of productive bars on the Lewes, Pelly, and Stewart soon followed. The first discovery of *coarse* gold was made in 1886 on Forty-mile river and was followed by important finds on streams flowing into Sixty-mile river. The Sixty-mile streams were actively worked until the announcement, in 1896, of the discovery of astonishingly rich creeks in the Klondike district drew most of the miners away. In 1897-98 a stream of 30,000 adventurers, including people of all trades and callings, poured into the country, all heading for the Klondike.

The discovery of the Klondike gold fields completely changed conditions in the hitherto unorganized and almost unknown Yukon territory. The town of Dawson was built at the confluence of the Yukon and Klondike rivers, and soon superseded Forty-mile as the chief commercial centre. A local administration, with courts of justice and other organizations necessary to government, was quickly established. The demand for better transportation was met by the construction of a railway from tidewater at the head of Lynn canal to the foot of the Whitehorse rapids on the Lewes river, from which point communication with Dawson is maintained by a large fleet of well-equipped river steamers. Telegraphic communication was also established with the outside world, and roads were constructed up the valleys of most of the producing creeks.

Ore Mining.—Ore mining follows placer mining in most mining camps, and such promises to be the case in the Yukon. Quartz veins carrying free gold have been found at several points in the Klondike district. An important copper belt occurs west of Whitehorse. Some development work has been done on a few of the claims and some rich ore, principally bornite, has been shipped. Silver and a great variety of ore of other kinds are said to exist. Lignite coal is found in paying quantities along the Yukon river, and some anthracite has been discovered in the region to the southwest of Whitehorse.

YULAN, n. *yô'lân* [Chinese]: in bot., *Magnolia conspicua* (*M. Yulan*), a tree, native of China, where it is 40 or 50 ft. high, though in some western lands it seldom reaches more than 20 or 25 ft. It has large, brilliant snow-white flowers, shining forth from gray and naked branches early in spring before the leaves appear.

YULE, n. *yūl* [Icel. *jól;* Sw. *jul;* Dan. *juul,* the Christmas festival, a feast: AS. *geóla,* Yule: origin uncertain]: the Christmas festival; Christmas. YULE-LOG,

or -BLOCK, large log of wood formerly brought in with much ceremony and placed on the hearth on Christmas eve. YULE-TIDE, the Christmas season.—The old name *Yule* points to heathen times, and to the annual festival held by the nations of n. Europe at the winter solstice as a part of their system of sun or nature worship. In the Edda, the sun is styled *fagrahvel* (fair or shining wheel); and a remnant of his worship, under the image of a fire-wheel, survived in Europe as late as 1823. The inhabitants of the village of Konz, on the Moselle, were in the habit, on St. John's Eve, of taking a great wheel wrapped in straw to the top of a neighboring hill, and making it roll down the hill, flaming all the way. The Old Norse *hvel,* AS. *hveol,* have developed into Icel. *hiol,* Sw. and Dan. *hjul,* Eng. *wheel;* but from the same root would seem to have sprung old Norse *jol,* Sw. and Dan. *jul,* AS. *geol,* Eng. *Yule,* applied as the name of the winter solstice, either in reference to the conception of the sun himself as a wheel, or, more probably, to his wheeling or turning back at that time in his path in the heavens. For the general nature of the festival, and the way in which the observances were overlaid or transformed and masked by the Christian institution, see CHRISTMAS. The burning of the *Yule-log* (or *Yule-clog*) testifies to the use of fire in the worship of the sun. See BELTANE.

YU'LEE, DAVID LEVY: American politician: b. West Indies 1811; d. New York 1886. In boyhood he came with his father, whose name was Levy, to Richmond, Va., where he was educated. Sent to Florida in 1824, he there studied law, and being elected to congress from that territory, served from 1841 to 1845, changing his name at this time from David Levy to David Yulee. He was United States senator from Florida 1845-51, taking a prominent part in senatorial debates, and again 1855-61, when he resigned on account of the civil war. He was then made a member of the Confederate congress. After the war he became president of the Atlantic and Gulf railroad, and was interested in the commercial development of Fernandina and Cedar Keys, Fla.

YUMA, Ariz.: city, county-seat of Yuma co.; on the Colorado river, and on the Southern Pacific railroad; 150 m. s.w. of Phœnix. It is in a mining region in which there are considerable productive farm lands on which are raised grains and fruits. There is one bank, four churches, and graded public schools. Pop. (1900) 1,402.

YUNG WING: Chinese diplomatist and scholar: b. Nan Ping, province of Kwang Tung, 1828, Nov. 17. After graduation from Yale in 1854, he was in the silk and tea trade until 1864, and then entered the governmental service of China. The China Steam Navigation Co. was established on his initiative, as was also the Chinese Educational Mission, for the education of Chinese in America. Yung Wing was made chief commissioner of

this enterprise, for which an appropriation of $1,500,000 was made. He was granted the rank of mandarin of the second grade, and appointed intendant of Kiang-Su province; and was for some time associate-minister to the United States, where he took up his residence in 1902.

YUNNAN, China: the most southwesterly province of the empire bordering on Tonkin and Burma; area, about 146,680 sq.m. It is very mountainous in the north and west, and has a general slope toward the southeast. The central part is a plateau about 6,500 ft. above sea-level, dotted with lakes and diversified by hills of red sandstone; but in the south the elevation of the land is much less. The province is traversed by several large rivers, principally the upper courses of the Yang-tse-kiang (called Kin-cha-kiang), the Si-kiang, the Song-ka or Red river, the Mekong, and the Salwin, but only the Song-ka can be regarded as of use for navigation within the province. The principal crops are rice, opium, and wheat, but tea, indigo, sugar-cane, cotton, earth-nuts, and many vegetables also are cultivated. Cattle, sheep, hogs, and other animals are reared in considerable numbers, and silk-worm-rearing is also extensively carried on. The chief wealth of the province, however, lies in its immense mineral resources, which include iron, coal, copper, gold, silver, lead, tin, zinc, cinnabar, and precious stones. The manufacturing industries include the making of silk goods and other textiles, leather goods, etc. The climate varies from the rigor of the northern districts, where the mountains are snow-capped for the greater part of the year, to the comparatively tropical condition of the southeast. A large part of the population consists of Miao-tse and other non-Chinese elements, and Mohammedanism has many adherents. Yunnan, the capital, in the southeast, is a busy and prosperous town, with large copper factories, and manufactures of silks and carpets. (Pop. 200,000.) Other towns are Chaotung, Tali-fu, Momein, Lingan-fu, Puerh, Tung-chwan, Meng-tse, and Ssumao, the last two being open to foreign trade since 1889 and 1898 respectively. The British have endeavored to establish a direct trade route between Yuannan and Burma, but from the physical features of the region this is not easy. The history of Yunnan can be traced back to the 3d century B.C. Owing to its distance from the seat of the central authority and its mountainous character this province long remained practically independent. The most noteworthy event of its recent history is the great Panthay revolt of 1855, which was not suppressed by the Chinese authorities till 1873. Pop. estimated at 12,324,574.

YURUARY: a river of Venezuela, rising to the e. of of the Caroni and flowing eastward to join the Cuyuni in about long. 61½° w., near the frontier of British Guiana. It gives its name to the Yuruary territory claimed by both Venezuela and Great Britain until 1899,

when the award of an arbitration court gave most of it to Venezuela. There are several gold-fields here, including El Callao, etc.

YURUCARES, or YURUCARE: Indians of Bolivia occupying the forest plains on the eastern slope of the Andes between the rivers Mamore and Beni. They include several tribes, are tall and shapely, and are almost white. They are hunters and warriors for the most part and their mythology is intricate and confused. Prior to the expulsion of the Jesuits, in 1767, numbers of them were attached to the Chiquito missions.

YUSUF, or YUSSUF, ABU AMRU: Arabic historian: b. Cordova 976; d. Xativa 1070. He was profoundly versed in the traditions of the Oriental Mussulman countries and wrote: *Behedjet-Almodjalisyn,* a collection of tales relating to Mohammed, etc.; *Tamhyd,* a commentary on one of the chief Mussulman works of religious and civil law; *History of the Opinions and Doctrines of the Principal Mussulman Sects; History of the Wars Against the Christians;* etc.

YUSUF or YUSSUF-BEN-TAXFYN: Moorish prince: b. Velad Sahara; d. 1106. He was the second prince of the Almoravide line and in 1086 aided the Emir of Seville, Al-Mo'tamid, to gain the victory over Alfonso VI. at Zalaca near Badajos. In 1090 he again invaded Spain, at the call of the emir of Seville, and taking advantage of Mohammedan dissensions gradually acquired the sovereignty of the kingdoms of Malaga, Grenada, Murcia, Cordova, Seville, Almeria, Badajoz, and Valencia, which he united to the kingdom of Morocco. Notwithstanding his power, Yusuf never assumed a higher title than that of emir, and in 1103 his son Ali was acknowledged heir of both his Spanish and Moorish possessions.

YUTHIA, *yôt'hē-â,* or AYUTHIA, *â-yôt'hē-â:* city, former capital of Siam, founded 1350. It is on the Meinam river, 40 m. above the present capital, which became the residence of the kings after Yuthia was destroyed during an invasion by the king of Ava, in Burmah. The town was rebuilt, and again became populous. Near it is a pyramid 400 ft. in height, called the Golden Mountain, and containing a huge statue of Buddha, of gold or gilded, in a vault that is said to be 150 ft. high. Little remains to indicate the former royal magnificence of the city, which is now a health resort of many from Bangkok during the summer. Pop. 30,000 to 40,000.

YVERDON, Switzerland: a town in the canton of Vaud, at the southwestern extremity of Lake Neuchâtel. Its castle, built in 1135, was used by Pestalozzi as an educational establishment in 1805-25, and now contains a library and museum. The town has also a fine townhouse, a hospital, and a memorial of Pestalozzi; and among the manufactures are railway wagons and mate-

rials, beer, etc. The town has also an extensive system of wharves. Yverdon was the *Eburodunum* of the Romans, and there are remains of the ancient walls. Pop. (1900) 7,985, mostly French-speaking Protestants.

YVES D'EVREUX, Pierre: Franco-Brazilian historian: b. Evreux, Normandy, France, about 1577; d. after 1620. He became a member of the Capuchin order in 1595 and was sent in 1612 with four missionaries as their superior, to Maranhao, Brazil, where a French colony has been established. He returned in 1614 and wrote: *History of the Most Memorable Things That Happened at Maranhao in the Years 1613 and 1614* (Paris, 1615; 2d ed. 1864), a continuation of the history of Claude d'Abbeville, a work of great historical value.

YVETOT, France: a town in the department of Seine-Inférieure, on an elevated plain, 23 m. n.w. of Rouen. It has manufactures of calico, hosiery, linen, leather, and baskets. Antiquaries have been much puzzled by an ancient chronicle, and still earlier edict, which gave the title of king to the lords of Yvetot. This edict was formally abrogated in 1681. *Le Roi d'Yvetot*, the well-known song by Beranger, translated by Thackeray, was a satire on Napoleon, which has immortalized the ancient dignity. Pop. (1901) 7,352.

YVON, Adolphe: French historical painter: b. Eschwiller, Moselle, 1817, Feb. 1; d. Paris 1893, Sept. 11. He studied under Paul Delaroche, traveled in Russia in 1843, and brought back with him a series of designs exhibited in Paris in 1847-8. He obtained the medal of honor at the Salon of 1857, 10 years later became an officer of the Legion of Honor and was professor of drawing at the Ecole des Beaux Arts, Paris. In 1855 he was commissioned by the French government to accompany the army to the Crimea. Among his most important works are: *The Remorse of Judas* (1846); *The Battle of Kolikova* (1850); *The First Consul Descending the Alps* (1853); *Marshal Ney Supporting the Rear Guard in Russia* (1855); *The Seven Deadly Signs*, designed after Dante (1855); *The Capture of the Malakoff* (1859); *Battle of Solferino* (1861); and an allegorical picture of *The United States of America* (1870), executed for A. T. Stewart. He was an artist of remarkable power and holds a prominent place among the historical painters of France.

YWIS. See Iwis and Wis.

Z

Z, z, *zē* (in the United States), *zĕd* (in the United Kingdom): a consonant, the 26th and last letter of the English alphabet. *Z* had no place in the original Latin alphabet, but was adopted in the time of Cicero from the Greek with *y* (*υ*), and thus stood last. In the Phœnician it stood 7th. In Greek it had the 6th place, and had the power of a double consonant, being equivalent to *ds* or *sd;* in Latin its use was confined to words of Greek origin. In High Ger., in which it is pronounced like *ts*, it corresponds to *t* in the Low Germanic and the Scandinavian tongues—e.g., *zeit* = Eng. *tide* (time). In It. *z* or *zz* mostly takes the place of the L. *ti*, as in *negozio* = *negotium*, *palazzo* = *palatium*, and is pronounced *ts*, or, preceded by *n*, *ds*. In English and in French it represents the flat sibilant sound of which *s* is the sharp. But in English, as in the majority of cases *s* has always been employed to represent the flat sibilant sound as well as the sharp (e.g., in almost all plurals, as *bones*, *cards*, in words like *revise*, etc.), there is a tendency to drop the use of *z*, except in a few individual words, such as *size*, *prize*. Many maintain the use of *z* in words derived from the Greek, especially from verbs in *izō*, as *baptize*, as well as in words formed on the analogy of these, as *legalize*. *Z* is sometimes doubled, as in *nozzle*, *buzz*, etc.

ZA, n. *zâ* [from the sound]: the seventh harmonic, as heard in the horn or Æolian string. It corresponds to B-flat.

ZAANDAM, *zân-dâm'*, or SAARDAM, *sâr-dâm':* town in N. Holland, on both banks of the Zaan, at its entrance into the Ij (a deep and narrow bay of the Zuider Zee), now converted into land intersected by canals, bearing rich crops. Z. is 5 m. n.w. of Amsterdam, on the other side of the bay. In former times, ship-building was largely carried on, but has nearly ceased. The whale-fishing, which 1701 employed 35 ships, has been abandoned. There is still considerable shipping-trade. The principal industries are sawing wood, preparing vegetable oil—chiefly from colza—manufacturing paper, grinding grain, mustard, dye-stuffs, snuff, etc., making starch, rope-spinning, and iron-founding. At a distance the town looks like a forest of wind-mills. Z. is a pleasant place, and many of the inhabitants are reputed to be wealthy. In 1697 Peter the Great worked in one of the ship-building yards as a carpenter, and the house in which he lived is carefully preserved. It was visited 1814 by Emperor Alexander of Russia, and is now inclosed with another building, to prevent exposure

to the weather. There are two Dutch Reformed churches, one Lutheran, two Bapt., and two Rom. Cath. churches, a Jewish synagogue, and several institutions for orphans and old people. Two public schools, a school of design, and two poor-schools are maintained by the town.—Pop. (1880) 13,171; (1887) 14,351; (1901) 22,022.

ZABERN, *tsâ'bĕrn* (the Roman *tabernæ*, tavern): name of three German towns on the w. side of the Upper Rhine, one of which was French till 1870. The first two are in the Palatinate (Rhenish Bavaria)—viz., BERG-ZABERN, on the Erlenbach, occupied chiefly with agriculture and some small manufactures; pop. about 3,000: and RHEIN-ZABERN, about 4 m. further e., on the same stream, noted for two battles there and at the village of Jokgrin, about 2 m. further s., between the Austrians and the French, 1793, June 29 and Aug. 20; pop. about 2,000.

The other, for distinction called ALSACE-ZABERN (French *Saverne*), till the war of 1870 in the French dept. Bas-Rhin, is now cap. of a circle in the German imperial territory Alsace-Lorraine. It is on the Zorn, which flows into the Rhine, on the Paris and Strasburg railway and highway, also on the Marne and Rhine canal. The town contains a palace and college. Its industries are the making of cloth, pottery, leather, and hardware, and transport of wood from the Vosges Mts. It belonged in the 12th c. to the bishops of Metz, and afterward to those of Strasburg. There are still some Roman antiquities in the college. In 1696 the fortifications were razed. The stately palace was rebuilt by Cardinal Louis de Rohan, famous in the story of the Diamond Necklace (q.v.); it served 1817,8 as barracks for the Austrian army of occupation; 1852 it became a home for the widows and daughters of the members of the Legion of Honor; and now it is again a barrack. The surrounding scenery is rich in ruins and picturesque effects. A spiral walk, the Zabern Path, about 9 m. long, leads, with many windings and 17 covered bridges, to the top of the Vosges, from which the spectator looks down on Alsace as a garden. The Pass of Zabern, or Saverne, which divides the Upper and Lower Vosges, is only 1,325 ft. high. The railway, the canal, the Zorn, and highway, all run side by side along the charming valley; and there is a constant succession of bridges, embankments, viaducts, and tunnels throughout the 45 minutes' journey from Z. to Saarbourg.—Pop of town about 6,600.

ZABISM, *zā'bizm:* religious system of the Sabæans. The article on SABEANS (q.v.) treats chiefly of certain inhabitants of Arabia Felix, the 'Sabaioi' of the Greeks, or 'Sabæi' of the Romans. It appears that this name was, in the 4th c. after Christ, superseded by that of Himyarites, and belonged to many tribes, that derived their descent from one Sabâ ('a descendant of Eber, or descendant of Noah'), who was called also Abd Shemesh—Servant of the Sun. These Sabæans, who considered themselves pure autochthons, in distinction from the immigrated tribes, have often been confounded with a number of other peoples of antiquity, and with professors of many forms of religious belief and speculation; in fact, the confusion that has sprung out of the unwieldy mass of information found respecting these many varieties, which information has been hopelessly mixed by many generations of orientalists and theologians, is almost without parallel. We shall not here survey the manifold systems and theories evolved from time to time, and handed down carefully; but we shall rather—in the main following Dr. Chwolson—enumerate the principal stages of Z. as it appears, considered as a religious phase of mankind. We premise that we exclude those imaginary Zabians who were taken by the mediæval Arabic, Jewish, and Persian writers to be identical with heathen or star worshippers, as well as those who, like the ancient Chaldæans, the ante-Zoroastrian Persians, the Buddhists, etc., were vaguely called Zabians by Mohammedan and other writers of the 12th c. These writers all start from the notion that idolatry, star-worship, and Sabæism were identical, and they called nearly all those who were neither Jews or Christians, nor Mohammedans or Magians, heathens or Sabæans. Z. had then become, like Hellenism, from being a *nomen gentile*, an appellative.

Confining ourselves to historical Z., we have to distinguish (1) the Chaldæan Zabians of the Koran. These are the 'Parsified' Chaldee heathens or non-Christian Gnostics—ancestors of the present Mendaïtes, or so-called Joannes Christians, who live not far from the Persian Gulf, and speak a corrupt kind of Chaldee-Aramaic. (2) The Pseudo-Zabians, or Syrian Zabians (in Harran, Edessa, Rakkah, Bagdad), or, since 830–1, remnants of the ancient Syrian but Hellenized heathens. These disappear (as Zabians) since the 12th c., but perhaps still exist, under some other name, in Mesopotamia. These Pseudo-Zabians spoke the most refined Syro-Aramæan dialect, and form the chief representatives of Z. emphatically deserving of the name. Those previously named, the Chaldæan (Babylonian) Zabians, who transferred that name to the Harranic Zabians, and were of great influence on the development of peculiar speculations of the latter, are the people meant under that designation by the Koran, and by the Mohammedans of this day. They are known also as Christians of St. John, or Mendaïtes. Among the Nabathean heathens of n.e. Arabia and the extreme s. of Mesopotamia, near Wasith and Bassra, there arose, in the last decennium of

the 1st c. after Christ, a man named Elxai (Elchasaï = Scythianus), born in n.e. Parthia (probably an adherent of Zoroastrianism, perhaps also acquainted with Buddhism), and spread among them Parsee ideas and Parsee religious rites and customs. They called themselves Mendaïtes—i.e., Gnostics. Many of their religious legends and tales they adopted at a later period from their Jewish and Mohammedan neighbors—chiefly, it is presumed, with a view of making themselves less hated by the ruling Mohammedan powers. They received the name of Ssabiin from their constant washings and purifications and baptisms. Their Arabic neighbors occasionally translated this word into the Arabic Al-Mogtasilah, 'those who wash themselves.' About a hundred years after the foundation of this sect by Elchasai, Manes was born of Mendaïte parents, and was brought up among the Mendaïtes. He remained faithful to this creed till his 24th year, at which period he founded the new sect of Manicheans, which did not at first depart so considerably from Mendaïsm as it did at a later period (see MANICHEAN). To these aboriginal Zabians there succeeded 830 a totally different sect under the same name—viz., the Harranian Syrians. They themselves derived their denomination from one Zâbî, who is variously called a son of Seth, son of Adam, or a son of Enoch or Idris, or a son of Methuselah, or of some fictitious Badi or Mari, a supposed companion of Abraham; while the Mohammedan writers, who, like the Greeks, endeavor to derive everything from their native tongue, declare it to be derived from *ssaba*, 'to turn, to move,' either because they turned to the paths of untruth, instead of that of the true religion—i.e., Islam; or, as the Zabians themselves sometimes explain it, 'because they have turned *to* the proper faith.' Another Arabic derivation makes them take their name, still more absurdly, from a root *ssabaa* = to fall away from the proper religion, or to turn one's head heavenward—i.e., for the purpose of worshipping the angels and the stars, etc. European scholars mostly have followed either Brooke or Scaliger, who variously hold the name to have sprung either from an Arabic root, which would point to their having come from the 'east,' or from the Hebrew word for 'Host,' viz., of heaven, which they were supposed to worship. The real state of the case, however, is that, whatever the derivation of the name, it did not belong originally to the Harranians, but was assumed by them, for the purpose of evading the Mohammedan persecutions, from the people mentioned in the Koran.

But it is not easy to say who these so-disguised Harranians really were; and what, since it was neither Judaism, nor Christianity, nor Mohammedanism, nor Magism, their religion really consisted of. Former investigators mostly took them to have been a distinct race and people, and their religion to have been composed of Chaldaism, Parseeism, Judaism, Christianity, Neo-Platonism, Gnosticism, and Cabbalistic speculations. This, however, is far from being the fact. Broadly speaking, they might perhaps best

be described as Syrians, who, partly descended from Greek colonists, had been subject so long to Syrian influences that they became in a manner Syrianized. Their religion was heathenism, the old heathenism of their Syrian fathers, which had, with incredible obstinacy, resisted not only Christianity, but rendered even Mohammedan ill-will harmless by stratagem. There can, however, be no doubt about certain foreign non-pagan elements having crept into it during the early Christian centuries. Eclecticism prevailed at that period, and it was not only Greeks and Romans that found the influence of foreign, chiefly Eastern, metaphysical speculation irresistible. But apart from that peculiar syncretism, we find in Zabism many other additions to Harran idolatry. There are, first of all, a certain number of legends about biblical personages from whom they pretend to be descendants—legends which, it may be presumed, they only for the nonce permitted to belong to their sacred traditions. There are further a number of laws of purity and impurity, and of sacrifices, which strongly remind of Judaism. Again names of Greek and Roman gods, such as Helios, Ares, and Kronos, occur—a fact that perhaps may be explained from the prevailing tendency of the period of exchanging the names of native divinities for Greek and Roman names. Besides these foreign elements there are certain metaphysical and physical views incorporated in their creed which are distinctly traceable to Aristotle, and, finally, the theurgico-Neo-Platonic religious philosophy of heathenism, such as it is found in Porphyry, Proclus, Iamblichus, and the rest. All these apparently incongruous elements, however, infused into it by the circumstances of the period, do not prevent Z. from being in reality heathenism. Were further proof needed, we should find it in the words of a celebrated Zabian, Thabît ben Korra, quoted by Barhebræus, in the shape of a panegyric on the town of Harran and its heathenism, uttered, as Barhebræus says, in his 'purblind obstinacy.' After speaking of Christianity—not to its advantage—Thabît rejoices over the blessings that still belong to his native place, Harran, through its having kept itself utterly unsullied by that faith. 'We,' he continues (the Zabians or Harranians), 'are the heirs and progenitors of heathenism, which has once been gloriously spread over this globe. Blessed is he who bears his burden for heathenism's sake, with firm hopes. Who has civilized the world and built its cities, but the noble and the kings of heathenism? Who has constructed the harbors and has made the rivers navigable? Who has taught the hidden science? To whom else has the deity revealed itself, given oracles, and told the things of the future, but to the most celebrated men among the heathen?... Heathens have done all these things. They have brought to light the healing of souls; they have taught their salvation; they have also made manifest the art of healing the body; they have filled the world with institutions of government and with wisdom, which is the highest good. Without heathenism, the world would be

empty and poverty-stricken, and swallowed up by great misery.'

Without entering into detailed account of the many sources whence our information is derived with regard to the creed itself, we note that they are written in Arabic, in Hebrew, and in Greek. The former are the most copious; those in Hebrew are represented chiefly by Maimonides; and the Greek are ascribed to various pseudonymous writers, among whom figure Aristotle and Hermes Trismegistus. From their various, and, to a great extent, contradictory statements, we owe the following indications regarding the principal points of this creed: The Creator, it teaches, is in his essence, primitivity, originality, eternity, One; but in his many manifestations in bodily figures, manifold. He is personified chiefly by the seven leading planets, and by the good, knowing, excellent, earthly bodies; but his unity is not thereby disturbed. It is, the Zabians say, 'as if the seven planets were his seven limbs, and as if our seven limbs were his seven spheres, in which he manifests himself, so that he speaks with our tongue, sees with our eyes, hears with our ears, touches with our hands, comes and goes with our feet, and acts through our members.' Nothing, we are told, is more foreign to Z. than—what holds true of the creed of the Sabæans only—rude star-worship. Z., according to the authority of Sharastani, expresses the idea that God is too great and too sublime to occupy himself directly with the affairs of this world; that he therefore has handed over the ruling of it to the gods, and that he himself takes only the most important things under his special care; that, further, man is too weak to address himself directly to the Highest, that he therefore is obliged to direct prayers and sacrifices to the intermediate deities to whom the rule of this world is intrusted. Thus the veneration shown to planets, and even the worshipping of idols, is nothing but a symbolical act, the consequence of that original idea. There are many gods and goddesses in Z. of this intermediate stamp. It is not the planets themselves, but the spirits that direct and guide them and deliver them, which are taken as deities of this kind—deities that stand to the spheres in the relation of soul to body. Apart from these, are those gods who cause or represent every action in this world. Every universal natural deed or effect emanates from a universal deity, every partial one from a partial deity that presides over part of nature. Everything that appears in the air, which is formed near the sky or arises from the earth, always is the product of certain gods, that preside over these manifestations, in such a manner that the rain in general, as well as every special drop of it, has a presiding numen. These spirits also mold and shape everything bodily from one form into the other, and gradually bring all created things to the state of their highest possible perfection, and communicate their powers to all substances, beings, and things. By the movement and guidance of these spiritual beings, the different elements and natural compositions are influenced in such a way that the tenderest plant may pierce the hardest cliff.

He who guides this world is called the first spirit. These gods know our most secret thoughts, and all our future is open to them. The female deities seem to have been conceived as the feeling or passive principle. These gods or intelligences emanate directly from God without his will, as rays do from the sun. They are, further, of abstract forms, free of all matter, and neither made of any substance nor material. They consist chiefly of a light in which there is no darkness, which the senses cannot conceive by reason of its immense clearness, which the understanding cannot comprehend by reason of its extreme delicacy, and which fancy and imagination cannot fathom. Their nature is free from all animal desires, and they themselves are created for love and harmony, and for friendship and unity. They are not subject to local or temporal changes, and they rule the heavenly bodies without finding the motion of the most heavy too heavy or that of the lightest too light. Their existence is full of the highest bliss, through their being near to the Most High, whom day and night they praise, without ever feeling fatigue or lassitude, to whom they are never disobedient, but whose will they always fulfil with supreme delight. They have a free choice and always incline to the good. 'These spiritual beings, our lords and gods, are our intermediators and advocates with the Lord of lords and God of gods.' All substances and types of the bodily world emanate from the spiritual world, which is the one from which everything flows, and to which everything returns, and which is full of light, sublime and pure. These two worlds correspond to each other, and are to each other like light and shadow. The way to approach these gods, and, through them, the highest essence, is by purifying our souls from all passions, by keeping a strict guard over our words and deeds, by fasting, heartfelt prayer, invocations, sacrifices, fumigations, and incantations. By steadfastly persevering in these and similar acts of devotion, man may reach so high a step of perfection that he may communicate even directly with the Supreme Power. The planets, as the principal representative and intermediate gods, are to be carefully observed, especially as regards—1, the houses and stations of the planets; 2, their rising and setting; 3, their respective conjunctions and oppositions; 4, the knowledge of the special times and seasons, the hours and days of the ruling of special planets; 5, the division of the different figures, forms, climates, and countries, according to their dominant stars—the prevailing notion of the Zabians being, like that of the Chaldees and the sect of the so-called Mathematicians (according to Sextus Empiricus), as well as of the Neo-Platonists in general, that everything below heaven was subject, in a manner, to the influence of stars, or the spirits that inhabit and rule them. Every substance and every action, every country and every hour, has its special planetary deity. It is therefore well to study carefully the special conjunctions and figures, as well as the special mixtures of incense, which might cause the individual numen to be propitious. Thus, e.g., according

to the Zabian belief, the first hour of Saturday stands under Saturnus, and it is therefore right and advisable to select at that time such prayers, seals, amulets, dresses, and fumigations as may be supposed particularly pleasing to that planetary god.

In order to address themselves to *visible* mediators, some of the Zabians are supposed to have directed their devotions to the stars themselves. But they soon found how futile a worship it was that addressed itself to things that appeared and disappeared in turn. They therefore manufactured permanent representatives of them in the shape of idols—idols wrought in as complete accordance as possible with the theurgical rules derived from the nature of the deity to be represented. They were of gold, to represent the sun; of silver, to indicate the moon. The very temples in which they were placed were of as many corners as were supposed to correspond to the form of certain stars.

We know but little of the cosmogonical notions of the Zabians. Sharastani, one of our principal authorities, only quotes 'Agathodæmon' as his authority for their assuming five primeval principles—viz., the Creator, Reason, the Soul, Space, the Vacuum. Out of these, all things are composed. According to another source (Kathibi), however, the Zabians assumed two living and active principles—viz., God and the Soul; further, a passive one, Matter; finally, two which are neither living nor passive—viz., Time and Space. Matter seems to have been held by them to be primeval and everlasting, and to it alone the existence of evil is attributable. God created the spheres only and the heavenly bodies therein. It is these spheres (fathers) which carry the types or ideas to the elementary substances (mothers), and out of the combination, conjunction, and motion of these spheres and elements the varying earthly things (children) are produced. Matter is, as we said, because of its defective nature, the source of evil, of ignorance, of folly; while the form is the source and fountain-head of the good, the right, the knowledge, and the understanding. Z. further assumes a renewal of this world after each great 'world-year'—a space of 36,425 ordinary years. At the end of these periods, the plants, the animals, and the men that had existed within it, cease to propagate themselves, and a generation of each of them, different from all previous ones, springs into life. How far this theory is identical with the Babylonian, Egyptian, and Indian theories on the same subject, we cannot here investigate; suffice it to call attention to the striking likeness apparent in them all.

Man, the Zabians teach, is composed of contradictory elements, which make him the vacillating, struggling creature that he is. Passions and desires rule him, and lower him to the level of brute creation, and he would utterly lose himself were it not for such religious rites as purifications, sacrifices, and other means of grace, by which he may be enabled to approach the great gods once more, and to attempt to become like unto them. There are different kinds of souls; or rather man's soul partakes partly of the

nature of the animal soul and partly of that of the angelic soul. The soul never dies, and punishments and rewards will affect only it, but not everlastingly. But rewards and punishments will be wrought not in any other or future world, but in this; only at different epochs of existence. Thus, all our present joys are rewards for good deeds done by us in former epochs; and the sorrows and griefs that we endure spring in the same manner from our evil actions at former stages. As to the nature of the general (world-) soul itself, they say that it is primitive, for if it were not so, it would be material, as every newly created being partakes of the material nature. Yet a material soul would be an impossibility. 'The soul, which is thus an immaterial thing,' says Kathibi, 'and exists from eternity, is the involuntary reason of the first types, as God is the first cause of the intelligenees. The soul once beheld matter, and loved it. Glowing with the desire of assuming a bodily shape, it would not again separate itself from that matter of which means the world was created. Since that time the soul forgot itself, its everlasting existence, its original abode, and knew nothing more of what it had known before. But God, who turns all things to the best, united it to matter, whieh it loved, and out of this union the heavens, the elements, and other composite things arose. In order that the soul might not wholly perish within matter, he endowed it with intelligence, whereby it eonceived its high origin, the spiritual world, and itself. It further conceived through it that it was but a stranger in this world, that it was subjeet to many sufferings in it, and that even the joys of this world are but the sources of new sufferings. As soon as the soul had perceived all this, it began to yearn again for its spiritual home, as a man who is away from his birthplace pines for his homestead. It then also learned that, in order to return to its primitive state, it had to free itself from the fetters of sensuous desires, and from all materialistic tendeneies. Free from them all, it would regain its heavenly sphere again, and enjoy the bliss of the spiritual world.'

From all this it will be seen, as we stated at the outset, that the Zabians, about whom so much has been theorized and fabled, were simply heathens who had to a certain extent adopted and modified Neo-Platonie ideas sueh as floated in the mental atmosphere of the early Christian centuries. It would be needless to enter into a discussion about the semi-fabulous personages to whom they aseribe the foundation of their creed, sueh as Agathodæmon, Arani, Hermes, and the rest; or some of those mentioned by other writers, such as Zerdusht, Nawassib, Orpheus, and the rest.

The life of this sect was short. After having been first on terms of great friendship with the ruling powers of Mohammedanism as well as with Christians and Jews, and having filled many of the highest and most responsible posts at the eourts of the caliphs, they were by degrees made the butt of fanaticism and rapaeity. Mulcted, perseeuted, banished at different periods, they disappear from history since the middle of the 11th c. Some obscure remnants

seem to have survived in remote corners of Mesopotamia, but they, too, no longer adhere to the original creed, but are mingled with the Mendaïtes, mentioned above, and the Shemsijeh, or sun-worshippers. Thus obscurely ended a sect which, for 200 years, had produced a host of men pre-eminent in every branch of learning and literature, in philosophy, astronomy, history, natural history, poetry, medicine, etc. Many of these men, whose name and fame reached Europe, were confounded with their Mohammedan contemporaries, chiefly because they lived in Bagdad, at that time the centre of learning, the seat of the caliphs and the high dignitaries of state. The Mohammedans, however, had so high an appreciation of Zabian learning, that it became proverbial among them, and they could explain it only by tracing it to a supernatural source, notably to Hermes (Trismegistus), father of the Zâbî, mentioned above.

We have in our sketch mainly followed Chwolson, who, aided by profound learning and acumen, has been the first to clear up the nature of Z., this stumbling-block of generations of investigators.—For detailed information on it and the many other points connected with it, see his large work, *Die Ssabier und der Ssabismus* (2 vols. St. Petersburg 1856). —See NEO-PLATONISM: GNOSTICS.

ZABRUS, n. *zā'brŭs* [Gr. *zabros*, voracious]: in *entom.*, a genus of *Carabidæ*, sub-family *Pterostichinæ*. *Z. gibbus* is a broadly oblong beetle of dark-bronze color, abundant in parts of Europe.

ZABUCAJO-NUTS, n. *zā-bū-kā'jû-* [native name]: in *bot.*, the fruit of *Lecijthis Zabucajo*, a S. Amer. plant. The nuts, two inches long and one broad, inclosed in urn-like fruits, are exported and eaten.

ZACATECAS, *zâk-a-tā'kâs:* inland state of Mexico, mostly between lat. 21° 31′ and 24° 50′ n., and long. 100° 10′ and 103° 40′ w.; bounded n. by Coahuila, e. by San Luis Potosi, Aguas Calientes, and Jalisco, s. by Jalisco, w. by Jalisco and Durango; 25,227 sq. m. It is one of the most mountainous states of the republic. It is traversed by a branch of the Sierra Madre Mountains, and on the w. are several spurs of this range. It is watered only by mountain streams, and its fertile regions are principally in the valleys. The climate is generally healthful, cold in the elevated portions, warm in the valleys. It is rich in silver mines; and mining is the principal occupation, though agriculture is extensively carried on in the fertile districts. It formerly ranked first as a silver-producing state, but is now second to Guanajuato. Zacatecas, the cap., is also the chief city. Pop. (1892) 526,066; (1900) 462,886.

ZACATE'CAS: city, cap. of the Mexican state of Z.; in the windings of a deep valley or ravine, between high hills, about 340 m. n.w. of Mexico, on the great Mexican tableland, 7,976 ft. above sea-level. It is built over a vein of silver, which has been deeply explored: 12 mines not far from the centre of the town have been worked for more than 300 years. The streets are narrow and crooked, but it has a fine appearance from a distance, from the size and

massiveness of its churches, and the elegance of some of its residences. It has a college, a gunpowder-mill, a mint (which 1772–1865 coined silver money to the amount of about $200,000,000), the govt. palace, and the cathedral. The water-supply is by a large aqueduct.—Pop. (1886) 46,000; (1892) 60,000; (1900) 39,912.

ZACHARIAS, *zăk-a-rī'as,* SAINT, Pope of Rome (pope 741–752): died 752, Mar. 14. He was a Greek by birth, and successor of Gregory III., and is noticeable as one of the series of Greek prelates by whom the destinies of Rome and Italy were much influenced in the 7th and 8th c. Z. deserves honorable mention in connection with a work of benevolence, which the Roman Church afterward consecrated by intrusting it to a special religious order—viz., the redemption of captives from the pagan masters by whom they had been held in slavery. During the troubles arising out of the Lombard invasion, Z., by his interposition in more than one instance in favor of the city of Rome with the Lombard kings, contributed to that prestige of the Roman see which eventually led to its obtaining the leadership of Italy, and in the end the temporal sovereignty of Rome and the adjoining territory. He died at Rome.

ZADONSK, *zâ-dŏnsk':* town of Russia, govt. of Voronej; 50 m. n. of the town of Voronej, about 230 m. s. of Moscow; on the left bank of the river Don. The trade of the town is not extensive, owing to the close neighborhood of the commercial towns Eletz and Voronej. The manufactures are insignificant. Z. possesses a renowned cloister.—Pop. 9,100.

ZAFARAN-BOLI, *zâ-fâ-rân'bō'lē:* town of Asia Minor, in Anatolia; about 190 m. e.n.e. of Scutari, at the junction of two small affluents of the Chati-su. It has four handsome mosques, a church, large baths and khans, and extensive suburbs. It has considerable trade in saffron (whence its name), which is cultivated extensively in the surrounding country.—Pop. supposed about 15,000.

ZAFFRE, n. *zăf'fẽr* [F. *zafre;* Sp. *zafre;* Ger. *zaffer,* zaffre: connected with *sapphire*]: the impure oxide of cobalt, which, melted with silica and potash, and reduced to powder, becomes the *powder-blue* of commerce. *Zaffre* is made by roasting cobalt ore and reducing it to powder, with addition of about three parts of the finest white sand used by glass-makers. It is extensively prepared in Saxony. When fused into a glass, it is intensely blue, and is much used by enamellers and porcelain manufacturers as a blue color.

ZAGAZIG, *zâ-gâ-zēg':* commercial town in Lower Egypt, cap. of the province of Sharkieh; at the junction of several railroads, one of which connects it with Suez, 75 m. s.e. It is connected also with Ismaïlia and Sucz by the sweet-water canal, whose construction increased its commerce. It is the principal depot for the cotton produced in the e. delta of the Nile. The ruins of the ancient city of Bubasis are near it.—Pop. (1882) 19,000; (1897) 35,715.

ZÄHRINGEN, *tsā'rĭng-ĕn:* small village near Freiburg, in Baden; in the Breisgau, formerly a province of Austria, but annexed to Baden 1805. It is historically noteworthy for the ruined castle from which the Dukes of Zähringen took their name, the ancestors of the reigning House of Baden (q.v.). The Hapsburgs (q.v.) are traced to the same stock. Guntram or Gunthrun the Rich, Count of Breisgau—son of the famous Erchanger, who raised himself to the dignity of Duke of Swabia and was beheaded for treason 917—is assumed as the founder of the House of Zähringen. The Zährings claim to be descended from his eldest son, Gebhard; the Hapsburgs, from the younger, Langelin. After the death of Duke Berthold I., 1077, the house was divided into two lines—the ducal or Zähring line, which became extinct in the male line 1218, with Berthold V., the founder of Berne; and the markgraf or Baden line, from which the present House of Baden is descended. The ducal Zährings exercised a beneficent sway over a great part of Switzerland.

ZAI'RE. See CONGO.

ZAITÛN. See CHINCHEW.

ZAKRZEWSKA, *zâkr-zhĕv'skâ,* MARIA ELIZABETH, M.D.: physician: b. Berlin, Prussia, 1829, Sept. 6; d. 1902. She studied medicine at a college in Germany, became an assistant and later a teacher in it, but could receive no degree from it; and 1853 she came to the United States and graduated at the Cleveland Medical College. With Elizabeth and Emily Blackwell she established the New York Infirmary, and for two years was its resident physician and manager. In 1863 she removed to Boston, where she founded the New England Hospital for Women and Children.

ZALEUCUS, *za-lū'kŭs:* lawgiver, B.C. 664, of the Epizephyrii, a Greek colony named from a promontory near which they settled in the s.w. extremity of Italy, 15 m. s. of the present town of Crotone. They were a branch of the Locri tribe of Greece. To remedy the disorders of the colony, the oracle at Delphi directed that laws should be established; and Zaleucus, of whom nothing is known except conflicting traditions, pretended to have received a code of laws from the goddess Minerva. The laws were severe, so far as anything is known of them; adultery was punished by the loss of the offender's eyes. Any one proposing a new law was obliged to do so with a rope around his neck, and he was strangled if his proposition was rejected. It is claimed that the code was the first reduced to writing by any Greeks. Zaleucus is said to have given up one of his own eyes to save one eye of his son, who had broken the law of chastity. He is said even to have slain himself at last for a violation of his own laws, though other tradition relates that he died in battle. The code existed till the historic period. The co-

lonial town continued to the 6th century after Christ, but disappeared in the middle ages.

ZALINSKI, Edmund, 'Louis Gray': American soldier and inventor: b. Kurnich, Prussian Poland, 1849, Dec. 13; d. 1909, Mar. 10. Coming to the United States in 1853 with his parents, who settled at Seneca Falls, N. Y., he was educated at the Syracuse High School, and entered the army in 1864 as volunteer aid on the staff of Gen. N. A. Miles. He was appointed second lieutenant 5th United States artillery in 1866, and captain in 1887. He was professor of military science at the Massachusetts Institute of Technology 1872-6, and was graduated in 1880 from the United States Artillery School at Fort Monroe and the School of Submarine Mining at Willett's Point, N. Y. From 1883 to 1889 he devoted himself to the development and perfecting of a pneumatic dynamite torpedo gun. Among his inventions are an intrenching tool, a ramrod bayonet, a telescopic sight for artillery and a system of range and position finding for sea-coast and artillery firing. He retired from active service in 1894.

ZALINSKI GUN. See Guns.

ZALOKOS'TAS, Georgios: Greek poet: b. Syrrhako, Epirus, 1805, Apr. 17; d. Athens 1858, Sept. 3. An ardent patriot, at 16 he fought in the insurrection at Missolonghi. Greek children are taught his songs, and among his best known poems are: *Missolonghi; Armatoles and Klepts; The Entrance of Preveza; Hours of Leisure; Marco Bozzaris;* etc. Several of his verses have been translated into Italian, Spanish, English, German, French, and Russian. His *Poetical Works* were published at Athens in 1860.

ZALUSKI, Jolef Andrezei: Polish prelate and scholar: b. Poland 1702; d. 1774. After serving for three years at Rome as ambassador to Pope Clement XII. he was made bishop of Kiev, but was banished to Kaluga for his opposition to the Dissidents. He is chiefly remembered for the service he did in awakening Polish literature. He spent his fortune in collecting a great library, which he bequeathed to Poland, but which was taken by Russia after the partition, and formed the nucleus of the Imperial Public Library.

ZAMA, *zā'ma:* city and fortress in Numidia, about 300 m. s.w. of Carthage, near which Hannibal was defeated by the Younger Scipio, B.C. 201. The flower of Hannibal's forces consisted of a small veteran army that had shared his fortunes for many years; most of the rest were of inferior quality, of many races, variously organized, and of dubious fidelity. But his greatest deficiency was in cavalry, an arm with which he had repeatedly decided the victory in former battles. In Scipio's army, on the other hand, Numidians, under Masinissa, were present in overwhelming numbers. The onset of

Hannibal's elephants, of which he had 80, was defeated and made worse than useless by the wise precautions of Scipio; the cavalry on his flank were scattered by the furious charge of Masinissa and Lælius; his front line of mercenaries beaten back by the more numerous and better-disciplined Romans. His veteran infantry, hemmed in on all sides, fought with the courage of despair, and were cut to pieces. Hannibal having, both before and during the battle, done everything which could secure the victory, escaped with a few horsemen. Of the Carthaginians, 20,000 were left dead on the field, and an equal number taken prisoners. Of the victors, 2,000 fell in the action.

ZAMACÖIS, *thâ-mâ-kō'ēs*, EDUARDO: Spanish genre painter: 1837-1871, Jan.; b. Bilboa. He studied art at Madrid; also in Italy, and, under Meissonier, at Paris; and became one of the leaders of the new Spanish school. Among his best known pictures are *The Hunchback, Diderot and D'Alembert, Cervantes as a Recruit, The Bull Fighters, A Court Jester of the Sixteenth Century,* and *The King's Favorite.* Excellent pictures by him have been bought by American collectors.

ZAMANG, n. *za-măng'* [native name]: immense tree growing in Venezuela, with a top spreading about a hundred feet in circumference; *Pithecolobium Saman.*

ZAMBALES, Philippines: a province of Luzon, in the southwestern part of northern Luzon; bounded on the west by the China Sea; on the north by Lingayén Gulf; on the east by Lingayén Gulf, and the provinces of Pangasinán, Tárlac, and Pampanga; and on the south by Bataan; length, 120 m.; width, 28 m. in the southern part, 25 m. in the northern part, and 12 m. in the central part; area, 2,160 sq.m.; with dependent islands, 2,210 sq.m. A chain of mountains near the eastern boundary parallels the coast; and there are also two groups of peaks but a few miles inland from the coast. There are numerous short rivers, and several thermal springs in the province. The chief industry of the province is agriculture; rice and wheat of superior quality are the special products; sugar, cotton, tobacco, and coffee are also extensively cultivated. Next to agriculture in importance is the raising of cattle, horses, carabaos, and hogs. The mechanical industries are very limited and primitive; copper and coal are mined; and there are indications of iron. The forest products are valuable, and amber is collected in considerable quantities on the coast. There are but few roads, and these are mostly impassable in the rainy season; a road and telegraph line parallels the coast for the greater part of the distance. Civil government was established in August, 1901, and the provincial governor reported the province in a peaceful and prosperous condition in January, 1902. Pop. (1903) 101,381.

ZAMBESI, or ZAMBEZI, South Africa: a river rising in

Portuguese West Africa, in lat. 11° 21′ 3″ s., and long. 24° 22′ e., and reaching the Indian Ocean at Chinde and Conceiçao in Portuguese East Africa, opposite Madagascar, after a total course of 1,650 m., of which the middle part belongs wholly to Rhodesia. The Victoria falls and the Kebrabasa rapids, the former in the west of Rhodesia and the latter in Portuguese East Africa, above Tete, are regarded as dividing the river into three sections, the Upper, Middle, and Lower Zambesi. The neighborhood of the source has an altitude of about 5,000 ft., and the river has its origin in a deep depression at the base of steep undulations, where the water oozes from a black marshy bog and quickly collects into a well-defined stream. Another head-stream of the Zambesi is the Kabompo, which rises in the northwest of Rhodesia, about lat. 11° 34′ s., and long. 25° 17′ e., also at an altitude of 5,000 ft., and in a region of open grassy downs. The former stream, at first known as Yambeshe and then as Liambai (Liambeshe), flows at first west with a southward trend, and then turns south-southeast. Ten miles of rapids precede the Sapuma cataracts (13° 7′ s.), where the river flows 'through a narrow rocky fissure into a pool of considerable extent. At about 14° s. it is joined by the Kabompo from the northeast and the remaining course of the Upper Zambesi has a south and southeasterly direction through the low-lying, grassy Marotse country, and is marked by various cataracts and rapids. Sesheki is a place of some importance on the left bank, near where the river begins to be wholly in British territory; and a short distance farther down, opposite Kazungula, it receives from the west the waters of the large tributary Kuanda. In about 18° s. there are the celebrated Victoria falls, discovered by Livingstone in 1855. Here the broad river suddenly plunges into a transverse chasm 400 ft. deep amidst a scene of tremendous grandeur. The gorge just below and in full view of the falls is spanned since 1904 by a lofty bridge on the Cape to Cairo railway. The Middle Zambesi, whose direction is east, northeast, and again east, receives the Guay-Shangani and Sanyati from the south; the Kafukwe and Loangwa from the north, the latter at Zumbo, where the river leaves British territory; and is interrupted by various rapids and rocks, especially at low-water, the Kebrabasa rapids being the first impassable obstacle to navigation from the mouth. The remaining course of the river (Lower Zambesi) has been described as, except for the Lupata gorge, 'merely a broad expanse of sand, 3 to 5 m. wide, with low, reed-fringed banks, and intersected by numerous shallow streams.' It passes the town of Tete, below which it is joined on the right by the Mazoe, and after passing Sena it receives from the left the Shiré from Lake Nyassa, the waterway to British Central Africa. It enters the Indian Ocean by several mouths, of which the Chinde one is the most practicable. The delta covers an

area of about 25,000 sq.m., and commences about 90 m. from the coast, a little below the confluence of the main stream with the Shiré. The river drains an area estimated at 600,000 sq.m. Its basin is separated from that of the Orange river on the southwest by a slight watershed, and from that of the Limpopo on the south by a mountain range. The valley of the Zambesi is capable of immense development in the way of trade. The Portuguese government has long exercised sway for 300 m. from the mouths of the river, and by the international arrangement of June, 1891, the river from the coast to the confluence of the Loangwa is recognized as being in Portuguese territory. The Zambesi and its affluents are now free to the flags of all nations. The Upper Zambesi was first explored by Livingstone, who reached the Liambai in 1851.

ZAMBESIA: one of the three districts of Portuguese East Africa, and a name popularly applied to the regions in Rhodesia divided by the Zambesi, and known respectively as North and South Zambesia.

ZAMBO, n. *zăm'bō*, ZAM'BOS, n. plu. *-bōz* [Sp. *zambo*, bandy-legged, a zambo]: the offspring of a negro and a mulatto; sometimes applied to the offspring of an Indian and a negro; also and more usually called SAMBO.

ZAMBOANGA, Philippines: (1) town, capital of the comandancia of Zamboanga; on the southern coast, 17 m. across the strait from Isabela. It was founded in 1635 as a base of operations against Moro pirates; shortly before the American occupancy of the islands it was almost entirely destroyed by fire, partly by the Spaniards and partly by the Filipinos; since then it has been rebuilt. Many of the houses are of stone, and the town contains a fort, the Castle of San Felipe, a cathedral, and a public hospital. It is connected with Manila by steamer, and is the chief market in the southern part of the archipelago for hemp, copra, and gutta percha. (2) Comandancia of Mindanao, forming the western peninsula of that island; bounded on the north by Dapitan, on the south by the Celebes Sea and Basilan Strait, on the east by Cotabato, and on the west by the Sulu Sea; length from northeast to southwest 103 m., and from east to west along the northern boundary 94 m.; area, 3,358 sq.m.; with dependent islands, 3,486 sq.m. The main mountain range extends west and then southwest from the northeastern boundary; another range traverses the Bañganinan of Flecha peninsula. The climate is the best in the Philippines, the temperature varying but a few degrees. Agriculture and stock-raising are the more important industries; rice, hemp, cotton, coffee, sugar, cocoanuts are cultivated; and cloves and nutmegs and vegetables are also among the valuable products of this province. Cattle, horses, and hogs are raised. There is an abundance of valuable woods, particularly teak and juniper; several saw mills, cocoanut mills, and

small sugar mills are in operation, but the mechanical industries are almost entirely for supplying home demand. There are indications of coal and gold, but no mining. There are no roads except near the towns. Pop. (1903) 20,692.

ZAMBONI'S PILE, n. *zăm-bō'nĭz pīl:* a dry voltaic pile or battery invented, in conjunction with De Luc, by Giuseppe Zamboni, an Italian physician and medical author.

ZAMIA, n. *zā'mĭ-a* [Gr. *zamia*, hurt, loss—alluding to the sterile appearance of the male fructification]: a genus of plants, nearly related to palms, of nat. order *Cycadaceæ*, of which the species are found in tropical parts of the world. They have a tree-like stem, which in some species is but an underground stub, with a single terminal bud and pinnate leaves. The wood consists of concentric circles, with very loose cellular zones between them. The male and female flowers are on separate plants, in tessellated catkins, whose scales differ in form in the male and female plants. The central part of the stem contains much starch, especially in old plants, and a kind of sago or arrow-root is made from some of them. The central part of the stem of the Breadtree (*Z. cycadis*), of s. Africa, which is 6 or 7 ft. high, with scaly stem, is much used for food by the Kafirs and Hottentots, who prepare it by wrapping it in a skin well rubbed with grease, burying it in the ground until it undergoes putrefaction, bruising it between two stones, making it into cakes, and baking it in wood-ashes. The only United States species is *Z. integrifolia* or *pumila*, the coontie, coonty, or coontah of Florida, with short, thick stem, mostly beneath the surface of the ground; it yields what is known as Florida arrow-root; and this and another species are called wild sago in Jamaica. Various species are beautiful hot-house plants in the n. states.—There are numerous fossil species of Zamia. Closely allied to it is the fossil genus *Zamites*.

ZAMIOSTROBUS, *zā-mĭ-ŏs'trō-bŭs:* generic name given by Endlicher to several cones from the Secondary and Tertiary strata, because they were supposed to be the fruits of fossil zamias. But Carruthers has shown (*Journal of Botany*, 1867, Jan.) that they belong to true Coniferæ. He has, however, in the same paper, described six species of fruit belonging to zamia-like cycads, to which he has given the generic title of *Cycadeostrobus:* they all are from the Secondary rocks. No cycadean remains whatever have yet been found in newer deposits.

ZAMITES, *zā'mīts:* generic name under which are included numerous forms of zamia-like leaves which occur in Mesozoic strata. No certain traces of the trunks have yet been found associated with them, and only one species (*Z. gigas*) is accompanied with fruit, and this is so anomalous that it casts considerable doubt on the determination of the affinities of the foliage.

ZAMORA, *thâ-mō'râ:* very ancient town of Spain, capital of the province of Zamora; 40 m. n. of Salamanca, 182 m. n.w. of Madrid; on the right bank of the Douro, here crossed by an old stone bridge; 2,000 ft. above sea-level. It is the see of a bishop suffragan of Santiago. Zamora was of great importance in the Moorish times, and is said to have been inclosed by seven lines of walls, with a moat between each. It is entered by seven gates, is surrounded by a wall, has a massive square tower with Norman arches, and many interesting remains of mediæval architecture. *La Magdalena,* a church of the Templars, afterward belonging to the order of St. Juan of Jerusalem, is a simple solid edifice of the 12th century, slightly modernized. There are 20 other churches, besides a theological school, barracks, prison, normal and other schools, library, museum, etc. It has manufactures of serges, linens, leather, hats, liqueurs, brandy, and considerable trade in wine and grain. Sir J. Moore urged the Junta of Salamanca to repair the defenses of Zamora and receive there his stores, but his retreat had commenced before they had done deliberating. Had Zamora been made tenable, Moore would have fallen back on it, instead of on Corunna. The French afterward got possession of it, and though no resistance was made, the town was sacked, neither age nor sex was spared, and the principal persons were put to death. It was again plundered by the French, and has never recovered these visitations. Pop. (1900) 16,417.

ZAMOSC, *zâ'mŏsts:* one of the most strongly fortified towns of Russian Poland, government of Lublin; 45 m. s.e. of Lublin, 140 m. s.e. of Warsaw; surrounded by water and a marsh. All the houses are in the Italian style with arcades. There is a large and beautiful castle opposite the former university, a town-hall and arsenal, four churches, monasteries, theatre, etc. There are beer and porter breweries. Pop. 12,500.

ZAMOUSE, *za-môs'* (*Bos brachyceros*): species of ox or buffalo, found in tropical parts of w. Africa. It is the *Bush Cow* of Sierra Leone; and differs from the buffalo and all other *Bovidæ* in important particulars, especially in the very large size and peculiar fringing of the ears, and in the total lack of dewlap. The forehead also is flatter than that of the buffalo. The color is a pale chestnut and nearly uniform; the hair is thin, and nearly erect; the ears have 3 rows of long hairs springing from the inside, and a tuft of long hairs at the tip. There is considerable space on the forehead between the horns, which are not long, extend outward and upward, and are suddenly incurved.

ZAMPOGNA, n. *tsâm-pŏ'nyâ* [It.]: the Italian bagpipes; a rough-toned reed instrument shaped like a flageolet.

ZANARDELLI, Giuseppe, *dzä-när-dĕl'lē:* Italian statesman: b. Brescia 1826, Oct. 29. After study at

Pavia, he was a volunteer in the war of 1848, then was for a time in journalism and gave lectures on law, but was forced by the Austrian officials to discontinue them. Elected deputy in 1859, he held various administrative posts, in 1876 became minister of public works, and in 1878 of the interior. From 1881 to 1883 he was minister of justice, and from 1887 to 1891 again held that portfolio. During the latter period of service he issued the penal code and commenced a reform in the magistracy. He was president of the chamber of deputies in 1892-4, in 1897 was again chosen, in December, 1897, accepted the portfolio of justice for a third time, but withdrew in May, 1898, once more to become president of the chamber. This post, too, he relinquished, to identify himself with the opposition, and at the fall of the Saracco cabinet in February, 1901, was able to form an administration with the aid of the extreme left. He was an orator of high rank, a steadfast liberal, and the recognized leader of the constitutional left.

ZAND. See ZEND.

ZANE, *zān*, EBENEZER: founder of the first permanent settlement on the Ohio river, now Wheeling, W. Va.: 1747, Oct. 7—1811; b. Berkeley co., Va.; of Danish descent. He settled on the Ohio 1770; built a blockhouse named Fort Henry, where he resisted attacks by Indians, the last one in 1781. He held several appointments, civil and military, and was made colonel. The city of Zanesville, O., founded on land owned by him, was named in his honor. He died in Wheeling.—His sister, ELIZABETH ZANE (1759-1847), when the fort was attacked by Indians 1777, and the ammunition had become exhausted, insisted that her life was of less importance than that of any man of the garrison, and gained consent to go for a keg of powder in her brother's house, 180 yards distant; she went and returned unharmed, though exposed to volleys from the enemy.

ZANESVILLE, *zānz'vĭl:* city, capital of Muskingum co., O.; at the junction of the Licking and Muskingum rivers; and on the Baltimore and Ohio, the Cincinnati and Muskingum Valley, the Cleveland and Canton, the Bellaire, Zanesville and Cincinnati, the Columbus, Shawnee and Hocking, the Zanesville and Ohio River, and the Cleveland, Akron and Columbus railroads; 60 m. e. of Columbus, 74 m. n. of Marietta, 168 m. e.n.e. of Cincinnati. It is in an agricultural and bituminous coal region, and with its superior shipping facilities has a large trade. It contains a belt-line connecting the different railroads, electric street railway, many churches, public schools, public library, gas, electric light, and water plants, national banks, state bank, private bank; and daily, semi-weekly, weekly, and monthly periodicals. The manufactures include rolling-mill products, steam-engines, carriages and wagons, cotton and woolen goods, window and bottle glass works, files, laundry soap, flooring and roof-

ing tiles, and building and paving bricks. Zanesville is on the line of the old 'national road'; was plotted and named Woodburne 1798; received its present name in honor of Col. Ebenezer Zane, a sturdy pioneer in that region, soon afterward; and was the capital of the state 1810-12. Pop. (1900) 23,543. (1910) 28,026.

ZANGWILL, *zâng'wĭl*, ISRAEL: English author: b. London 1864; of poor Jewish parents. Until his ninth year he was educated at Plymouth and Bristol, and was then placed in the Jews' Free School at Spitalfields, where he became head-boy, three times obtaining the scholarships and medals founded to commemorate the admission of Jews into parliament. He graduated B.A. at London University before he was 21 years of age. In conjunction with a friend he wrote a humorous romance called *The Premier and the Painter*, published 1888. In 1889 he founded *Ariel, or the London Puck*, which was suspended at the end of two years. *The Bachelors' Club* (1891) was instantly successful on both sides of the Atlantic, and enabled Zangwill to give his time to literature. In 1892 he published *The Children of the Ghetto*, a study of outlawed Jewry. *The King of Schnorrers* (1894) humorously depicted the life of a Sephardim mendicant, and this work, with *Ghetto Tragedies* (1893), ended his Hebrew delineations. Under the head of 'Without Prejudice' he has contributed *causeric* to the *Pall Mall Magazine*, and gossipy paragraphs to the New York *Critic* under the head of 'Men, Women, and Books.' He published *The Big Bow Mystery* (1891); *The Old Maids' Club* (1892); *Merely Mary Ann* (1893); and *The Master* (1894); *They That Walk in Darkness* (1899); *The Mantle of Elijah* (1900); *The Grey Wig* (1903); *The Celibate's Club* (1904); *Blind Children* (verses, 1903).

ZANONIA, n. *za-nō'nĭ-a* [after James *Zanoni*, superintendent of the Botanical Garden at Bologna, and author of a work on plants]: climbing plants, genus of *Nhandirobeæ*. The leaves of *Zanonia indica*, beaten up with milk and butter, are applied as a liniment in antispasmodic affections. They are also used in baths in nervous diseases.

ZANTE, n. *zăn'tē:* a golden yellow species of sumach from the island of Zante, in the Mediterranean, used for dyeing; called also young fustic, and fustet.

ZANTE, *zân'tā* (ancient *Zacynthus*): Grecian island, one of the principal Ionian Islands; about 9 m. from the w. coast of the Morea, and 8 s. of Cephalonia; about 24 m. long, 12 broad, 64 m. round; 156 sq.m. The greater part of the island consists of a plain, stretching n. to s., with a breadth of 6 to 8 m., bounded on the w. by a line of hills. The vine is extensively cultivated on the plain, and the wine produced is considered to be of superior quality. Currants, produced from a dwarf species of vine, originally brought from Corinth (whence the name *currant*), are the staple product. There are also nearly

40 different kinds of vine, and 10 of olive—including the *karudolia*, yielding the best edible olive-berry. Pomegranates, olives, melons, peaches, and citrons also are grown. —Zante is said to have been colonized by Achæans from the Peloponnesus; and is mentioned in Homer with the epithet 'woody,' which, however, is not apt at the present day, though it is justly called, in an Italian proverb, 'flower of the Levant.' It is subject to frequent earthquakes, which seem likely to recur about once in 20 years. The most notable mineral feature of Zante is its pitch-wells, described by Herodotus, about 12 m. s. of the town of Zante, in a marshy district. Pop. (1879) 44,522; (1889) 44,070; (1900) 45,032.

ZAN'TE: city, capital of the island of Zante, and the largest town in the Ionian Islands; at the head of a small bay or harbor on the e. coast of the island; on the site of the ancient town, of which the only remains are a few columns and inscriptions. The houses stretch along the semi-circular outline of the bay a mile and a half and extend up the slope of the castle-hill. Most of the streets are narrow, but clean, and the older houses are in the picturesque Venetian style: the huge lattices of wooden framework, resembling those employed in Eastern harems, with which the windows were formerly fitted, are being rapidly discarded. The principal street is broad and handsome, the churches are numerous, and the market-place spacious. The harbor has been greatly improved of late years; it is now protected by a long mole, and has a light-house; but is still somewhat exposed and insecure. A magnificent and extensive view is obtained from the citadel in the highest part of the town. Zante is the see of a Greek protopapas and of a Rom. Cath. bishop.—Pop. 15,000.

ZANTIOTE, n. *zăn'tĭ-ōt*, or ZANTIOT, n. *zăn'tĭ-ŏt:* a native of Zante, one of the Ionian Islands.

ZANY, n. *zā'nĭ* [O.It. *zane:* It. *zanni*, familiar forms *Giovanni*, or *John*, hence a silly-John, a clown]: clown in a play; a merry-Andrew: V. to imitate; to play the buffoon. ZA'NYISM, n. *-nĭ-ĭzm*, the state or conduct of a zany.

ZANZIBAR, East Africa: (1) A former sultanate comprising the whole coast between Magdishu (Magadoxo), about lat. 2° n., and Cape Delgado, lat. 10° 42′ s., with the four islands of Zanzibar Pemba, Lamu, and Mafia. The continental part of the sultanate in 1890 was divided between British East Africa and German East Africa; while the island and town of Zanzibar, and the island of Pemba became a British protectorate; joint area 1,020 sq.m.; pop. est. 250,000. (2) The island of Zanzibar with an area of 600 sq.m., is very fertile and well cultivated, being especially suited for the cultivation of cloves, sugar, coffee, cocoa, and various spices, of which there is a considerable export. The heterogeneous

population estimated at 200,000 includes Europeans, Arabs, half-caste Portuguese from the Malabar coast of India, and the Suahilis from the mainland. (3) Zanzibar, the chief town (pop. 100,000) on the west side of the island, is the centre of trade for the eastern seaboard of Africa, and of missionary and exploring work for the interior.

ZAPOLYA, John: king of Hungary: b. about 1487; d. 1540. After the death of Louis II. at Mohács (1526) he was elected king of Hungary by the National party, having previously been voivode, or prince, of Transylvania. The crown was contested by Ferdinand of Austria, who was at first so successful as to compel Zapolya to flee to Poland. But the latter, with Turkish assistance, by 1529 had subdued a great part of Hungary, together with the capital city of Buda, as well as Transylvania. The kingdom was divided between Zapolya and Ferdinand in 1538 by the treaty of Grosswardein.

ZAPPI, Giovanni Batista Felice: Italian poet: b. 1667, Mar. 18; d. 1719, Aug. 30. After a legal training at Bologna, he went to Rome, where he gained a brilliant reputation as jurisconsult and poet. He assisted in establishing the Academy at Arcadians, in which he held the name Tirsi Leucasio. His verse abounds in fantastic adornments. A collection of it appeared in 1776, and it has been otherwise published, both separately and in association with that of his Arcadian colleagues. He received the patronage of Pope Clement XI.

ZAPTIEH, n. *zŏp'tĭ-ā* [Turk]: a Turkish policeman.

ZARA, Austria: a seaport town, capital of Dalmatia, on a promontory, which was converted into an island by cutting through the narrow isthmus which formerly connected it with the mainland, 70 m. n.w. of Spalatro. It was a fortress till 1873, and still has four gates and mediæval ramparts, the latter now converted into a public promenade. It has steep and narrow streets; several squares; an ancient and interesting cathedral, in the Lombard style; several other churches; a town-house; a lyceum, gymnasium, archiepiscopal seminary, normal and other schools; a civil and a military hospital; and a capacious but somewhat shallow harbor, admitting warships of medium size. It has manufactures of rosoglio, maraschino, and glass, and some trade. Zara has stood many sieges, particularly one in 1202, when it was taken by the Venetian doge Dandodo, with the assistance of the French crusaders; and another in 1346, when it was taken by Marino Faliero in the face of a large Hungarian army. Pop. (1900) 32,506.

ZARAFSHAN'. See Bokhara.

ZARAGO'ZA. See Saragossa.

ZARAISK, *zâ-rīsk':* Russian town, govt. of Riazan; 32 m. n.w. of the town of Riazan, 80 m. s.e. of Moscow;

a few miles from the right bank of the Oka, tributary of the Volga. The town was founded in the 13th century; and 1531 Ivan the Terrible erected on the site of the old fortifications a strong fortress, which thrice resisted the assaults of the Tartars, and which still stands. Another noteworthy object is the Cathedral of St. Nicolas, which dates from 1631. There are manufactures of soap and candles, also several tanneries and breweries; these, however, produce only a supply for the inhabitants. The commerce of the town has greatly declined since 1847, when the new road of Riazan was opened, leaving Zaraisk out of the way.—Pop. 8,078.

ZARATE, Antonio Gil y: Spanish dramatic poet: b. San Lorenzo de l'Escurial, Spain, 1795; d. 1860. He was educated in Paris; and on his return to Spain became professor of physics in Granada. He afterward wrote dramas notable for striking situations, lively dialogue, and elegant versification; among them are: *Blanche of Bourbon* (1835); *Guzman the Brave; The Czar Demetrius.* He also published a history of Spanish literature.

ZARATE, Augustin de: Spanish historian: b. about 1492; d. Madrid about 1560. After holding for 15 years the office of comptroller of Castile he accompanied Nunez Vela, viceroy of Peru, to South America in 1543, and while there was not only an eye witness of many historical events of importance, but made a close study of Peru and its annals. On the fall of Gonzalo Pizarro he returned to Spain and in 1555 published *Historia del descubrimento y conquista de la provincia del Peru* (History of the Discovery and Conquest of the Province of Peru). There have been many later editions of this most valuable work, and it has been translated into French and Italian.

ZARATHUSHTRA, *zăr-ă-thôsh'tra.* See Zoroaster.

ZAR'ATITE: an emerald-green incrustation usually on chromite. It is a hydrous basic carbonate of nickel. Its best known locality is at Texas, Pennsylvania. It is often called 'emerald nickel.'

ZAREBA, *za-rē'ba,* or Zereba, *zā-rē'bā:* an inclosure or fenced camp for protection against wild animals and other enemies, especially during the night: used in the Soudan and other parts of Africa.

ZARLINO, Giuseppe: Italian composer: b. Chioggia, near Venice, 1520; d. Venice 1590, Feb. 14. He became a Franciscan in 1537 and in 1541 went to Venice to study music with Willaert. In 1565 he was appointed choir master of Saint Mark's, Venice, and continued in that position till his death. He was especially famous for the music he composed to be performed on the occasion of the victory of Lepanto. He determined the relations of the tones and semi-tones more precisely than had previously been done, and on this subject wrote *Instituzioni*

armoniche (1562-73). Other works of his are: *Dimostrazioni harmoniche* (1571); *Sopplementi musicali* (1588). Among his musical compositions may be named *Modulationes* (1566); *Lectiones pro Mortius* (1563).

ZAUSCHNERIA, *zaw-shnē'rĭ-a:* beautiful plant of the Evening Primrose family (*Onagraceæ*), of which only one species is known, *Z. Californica.* It grows ½ ft. high, with downy stems and leaves, and bright scarlet flowers, 2 in. long, with projecting style and stamens, resembling fuchsias. The flowers grow from the axils of the upper leaves, and the calyx as well as the corolla is highly colored. It is a perennial, blooming in the latter part of the season, and needs protection in winter n. of New York. It was named from Zauschner, Bohemian botanist.

ZAVALA, Joaquin: Nicaraguan politician: b. Nicaragua about 1839. He entered the army, became prominent in political affairs and was president of Nicaragua 1879-83. He was afterward minister to the United States and in 1893 headed the insurrection which secured the deposition of President Sacaza in May 1893. On July 17 of that year he was declared provisional president, but only to lose his position through another revolt a fortnight later.

ZAX, n. *zăks* [AS. *seax;* Icel. *sax,* a knife or short sword; OHG. *saks*]: a slater's hatchet, with a sharp point on the pole, for perforating the slate to receive the pin. It is about 16 in. long and 2 in. in width; it is somewhat bent at one end, and the spur is 3 in. long.

ZAYAT, n. *zâ'yăt* [native name]: in Burmah a shed or portico for the accommodation of travellers, loungers, and worshippers, found in every Burmese village, and attached to many pagodas.

ZBYLITOWSKI, Andre: Polish writer, philosopher and poet: b. Galicia 1732; d. 1813. He was doctor of philosophy for a time at Cracow and later made extensive travels through South America and Europe. He has published *Rhythms in Polish Verse* (1763); *The Marshal; A Beard;* etc.

ZBYLITOWSKI, Pierre: Polish writer and poet: b. in the palatine of Lublin 1684; d. Warsaw 1757. He was educated at the University of Warsaw and after leaving there traveled extensively through Europe and North America. He has published *Porydia* (1734); *Epigrams* (1735); *Lucie,* a poem (1739); etc.

ZEA, *thā'ä,* Francisco Antonio: Columbian naturalist and statesman: b. Medellin, New Granada (Colombia), 1772, Oct. 21; d. Bath, England, 1822, Nov. 28. After study at the College of Popayan, he was connected with the botanical expeditions of Mutis, in 1795 was sent to Spain under arrest on the charge of circulating republican literature, and though acquitted in 1799 was forbidden to return to New Granada. He carried on botanical researches in Europe, but in 1815 joined Bol-

ivar at Jamaica. In 1819 he was chosen vice-president of Colombia by the congress of Angostura, and in 1820 went to Europe as envoy of the Colombian republic to France and England. He has sometimes been styled the *Franklin of Colombia.* Among his published works are: *Memoria sobre la Quina según los Principios de Mutis* (1800), and a *Historia de Columbia* (1821).

ZE'A. See MAIZE.

ZEAL, n. *zēl* [F. *zèle*—from L. *zēlus;* Gr. *zēlos,* emulation, jealousy—from *zeein,* to boil, to seethe: It. *zelo*]: great ardor in the pursuit or support of anything; enthusiasm; fervor. ZEALOT, n. *zĕl'ŭt* [Gr. *zēlōtēs*]: one who engages warmly and earnestly in any cause; one carried away by excess of zeal; a fanatic. ZEALOTS, n. plu. *zĕl'ŭtz,* a Jewish fanatical sect, who carried on a desperate struggle with the Romans which resulted in the fall and total destruction of Jerusalem, A.D. 70. They were also called the *Sicarii* or *Assassins* on account of their excesses in behalf of the Mosaic law. ZEAL'OTRY, n. *-ŭt-rĭ,* excessive enthusiasm; fanaticism. ZEAL'OUS, a. *-ŭs,* warmly engaged in any pursuit or cause; very earnest; enthusiastic. ZEAL'OUSLY, ad. *-lĭ.* ZEAL'OUSNESS, n. *-nĕs,* the state or quality of being zealous.

ZEA'LAND (island of Denmark). See SEELAND.

ZEA'LAND (province of the Netherlands). See ZEELAND.

ZEBALLOS, or CEBALLOS, PEDRO (ZEBALLOS CORTES Y CALDERON): Spanish general: b. Cadiz 1715, June 29; d. Cordova 1778, Dec. 26. Entering the army as a cavalry captain in 1738, he became a lieutenant-general in 1755 and was despatched to Buenos Ayres as governor the next year. On the outbreak of the war with Portugal and England in 1762, Zeballos besieged the Portuguese port of Colonia de Sacramento, near the entrance of the Uruguay river, forcing its surrender 1762, Nov. 2, and capturing 26 English ships in its harbor. He returned to Spain in 1767 and in 1777 was made viceroy of the newly established viceroyalty of La Plata. On his way thither he wrested Santa Catharina from the Portuguese and retaking Colonia de Sacramento, which had reverted to Portugal since its former capture, destroyed it. He was relieved of his duties in 1778 and returned to Spain.

ZEBID, Arabia: a town in Yemen, on the inland route from Hodeida to Mokha, 60 m. n. of the latter. It was formerly the seat of a long line of princes, and was famous for its commerce and learning. The population has dwindled to 7,000 inhabitants.

ZE'BRA: the name of several animals, natives of Africa, belonging to the family of the horses. The zebra belongs to the same general type as the ass, distinguished from *Equus* (the horse) proper by smaller size and by having the body more or less banded black upon yellowish. The forelegs only possess the 'warts,' seen in both

fore- and hind-limbs in the horses; and the tail is 'tufted.' The typical or mountain zebra (*Equus zebra*) inhabits South Africa, but it is now almost extinct. A few specimens, however, are strictly preserved in the mountainous districts of eastern Cape Colony, where, until about 1875, they abounded in herds on the plains. The body is cream-colored, its characteristic bands being deep black. The stripes are drawn at right angles to the axis of the body. The legs are striped right down to the hoof, but the under part of the body has no stripes. The neck bears a faint development of skin or *dew-lap*, and the mane is very short. The animal was long considered untamable, but experiments made since 1872 have shown that with proper treatment it can be made to work well in harness. Any general utilization and improvement of it, however, seems impracticable. The dauw, or Burchell's zebra (*Equus burchelli*), is higher and more graceful than the true zebra, and is the one commonly seen in menageries. Its stripes are narrower and somewhat differently disposed from those of the true zebra, and extend under the belly, but are absent from the lower part of the legs. It has been driven northward, and is now rare even in the Transvaal. Chapmann's zebra (*E. chapmanni*) is another variety, found from Bechuanaland north to the Sudan. Grévy's zebra (*E. grevyi*) is restricted to Abyssinia and Somaliland. The quagga is a near ally of the zebras.

ZEBRA WOLF: an early colonial name for the wolf-like, striped, predatory marsupial of Tasmania.

ZEBRA WOOD: in botany and commerce: (1) A kind of wood, imported from South America, and used by cabinet makers, produced by *Connarus guianensis* (*Omphalobium lamberti*), a large tree belonging to the natural order *Connaraceæ*, and growing in Guiana. Its colors consist of brown on a white ground, clouded with black, and each strongly contrasted, thus somewhat resembling the skin of a zebra. It is also called pigeon wood, and is used for furniture. (2) The wood of *Eugenia fragrans*, variety *cuneata*. It is a shrub about 8 ft. high, growing in Jamaica. (3) The wood of *Guettarda speciosa*, an evergreen tree 25 ft. high, with scarlet-colored flowers, growing in the East Indies.

ZEBU, or CEBU. See PHILIPPINE ISLANDS.

ZEBU, *zē'bū*, or INDIAN OX, or BRAHMIN OX: the E. Indian bull or cow, very nearly allied to the common ox, of which naturalists generally regard it as a mere variety, though some think it a distinct species (*Bos Indicus*). The most conspicuous distinctive character is a large fatty hump on the back, above the shoulders; also the legs are rather more slender and delicate than in the European ox. The hump attains very great size in animals plentifully supplied with food and not compelled to work; in those which are ill fed or hard worked it is

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CRAWSHAY'S ZEBRAS IN THE NEW YORK ZOÖLOGICAL PARK.

comparatively small. It is alleged that intermixture takes place freely with the common ox, and that there is no difference of anatomical structure; but these statements require verification. Vasey found the number of caudal vertebræ in the zebu to be only 18, while in the common ox it is 21; also the period of gestation in the zebu is said to be 300 days, while in the common ox it is 270. The zebu is diffused over India, China, the Asiatic islands, Madagascar, and the e. coast of Africa. There are many breeds, differing much in size; the largest being larger than any oxen of Europe, while the smallest are not much larger than a large mastiff. The hump of the largest breeds is said to be sometimes 50 lbs. in weight. European residents in India esteem the hump delicious for the table. There are hornless breeds; but most of the breeds have short horns. There is a breed with two fatty humps, one immediately behind the other, which is common in the vicinity of China. The voice of the zebu resembles the grunting of the hog almost as much as it resembles the lowing of the ox. The zebu is used in India both as a beast of draught and of burden, and is used occasionally for riding, being able to travel 20 to 30 m. a day. It is very gentle and docile.

The Brahminy or sacred bulls of the Hindus, consecrated to Siva, are of this kind of ox. They are caressed and pampered by the people, and to feed them is deemed a meritorious act of religion. The Brahminy bull may go where he pleases; it is not lawful to beat him, even if he be eating a valuable crop, or if he enter a shop and devour the articles exposed for sale. He soon learns to despise shouting, which is the ordinary expedient to drive him away, and makes himself at home everywhere.

ZEBULUN, *zĕb′ū-lŭn:* one of the 12 tribes of Israel, descendants of the 6th son of Jacob by Leah. The blessing of Jacob was that Zebulin should dwell at the haven of the sea; and that of Moses was that Zebulun should suck of the abundance of the seas. In the Exodus from Egypt the tribe marched third in the order; at Sinai it numbered 57,400 men; on the plains of Moab 60,500. Its allotment in Canaan was w. of the Sea of Galilee, and included Nazareth and Cana. The tribe of Zebulun is mentioned with honor. Deborah directed Zebulun and Naphtali to be summoned against the enemy, Sisera; and in her song of triumph she said, 'Out of Zebulun came they that handle the pen of the writer.' Gideon also called the tribe and two others to be victors. Zebulun furnished one of the Judges, Elon. To Hezekiah's call for religious reform, Zebulun responded humbly and readily. And on this tribe and Naphtali first shone the 'great light' of prophecy, the Christ.

ZECHARIAH, *zĕk-a-rī′a:* eleventh of the minor prophets of Israel; called in the book of prophecy which goes

under his name 'the son of Berechiah, the son of Iddo,' but in Ezra, 'the son of Iddo': b. in Babylonia, during the captivity. He accompanied the first band of exiles, more than 40,000 men with their households (according to the decree of Darius, B.C. 536), on their return to Palestine under Zerubbabel and Joshua. He appeared as a prophet in Jerusalem at the same time with Haggai, in the 2d year of Darius Hystaspes (B.C. 520). Very little is known of his personal history, but evidently he was a man of influence and a leader among his countrymen. He combined in himself (if brought up as son and successor of Iddo) the office of priest with that of prophet. Ezra expressly ascribes to Haggai and Zechariah the merit of stirring up, by their prophetic inspiration, the patriotic enthusiasm of the Jews to complete the rebuilding of the Temple. Later traditions, probably more or less in the line of historic fact, state that he assisted in providing for the service of the Temple (various of the liturgical psalms being ascribed to Zechariah and Haggai), and that he was a member of the Great Synagogue (see SYNAGOGUE, THE GREAT).

The prophecies of Zechariah may be divided into three parts: the first (chapters i.—viii.) consist mainly of a series of visions relating to the building of the Temple, the glory of the city, the removal of all abominations out of the land, etc., and ends with a prediction that Jerusalem will become, as it were, a centre of religious worship to all the world. The second (ix.-xi.) threatens Damascus and Phœnicia and the cities of the Philistines with ruin; predicts that Judah will be greater than Javan (Greece), that Israel and Judah will be reunited—though almost immediately he symbolically shows the impossibility of this—and that both Assyria and Egypt will be humbled. The third part sets forth that dark times for Judah are drawing nigh, which shall be as an ordeal for the nation. After sore trial it shall come forth thoroughly purged from iniquity, and then the Lord will appear in his glory on Mount Olivet, fight victoriously against the hosts of heathendom, and compel all who are not destroyed by his wrath to worship him at Jerusalem. A millennium of holiness will then begin: 'In that day shall there be upon the bells of the horses, "Holiness unto the Lord;" . . . yea, every pot in Jerusalem and in Judah shall be holiness unto the Lord of hosts' (xiv. 20, 21).

Numerous biblical critics, in Germany and England, judging from the internal evidence, consider the first part only (i.—viii.) to be the work of Zechariah. There is indeed a unity, consistency, and sequence in the visionary predictions, and a harmony both of style and matter—the imagery bearing very distinctly the impress of those two master-spirits of the exile, Ezekiel and Daniel—that no candid critic can overlook; while the remaining chapters (ix.-xiv.) seem unconnected in subject with what

precede; and speak of idols and false prophets in terms not literally applicable to the times subsequent to the return from the captivity. The style also is softer, richer, more poetical: the spirit of Ezekiel is exchanged for that of Jeremiah or for the latter portion of Isaiah. The critics, however, are not agreed whether these chapters of the second part are the work of one or two authors. On the whole, while the argument for more than one author is not without some force and more plausibility, the evidence has not, to the majority of students, been sufficient to compel a departure from the traditionary view of a single author.

ZECHIN, n. *zĕk'ĭn* [It. *zecchino,* a sequin (see SEQUIN)]: an Italian gold coin—generally SEQUIN. ZECCHINO. (See DUCAT.)

ZECHSTEIN, *zĕk'stīn* [Ger. 'mine-stone']: deposit of calcareous rock which covers the Kupfer-schiefer, and which received this name because it must be cut through before reaching the mineral-bearing beds beneath. It is the equivalent in Thuringia of the fossiliferous limestones of Permian age of n. England.

ZED, n. *zĕd:* the common name in the British islands of the letter Z.

ZEDEKIAH, *zĕd-ē-kī'a,* originally MATTANIAH, *măt-ta-nī'a,* last King of Judah: reigned B.C. 597-586; d. prob. in Babylon; son of the 'good Josiah' by his wife Hamutal. Zedekiah succeeded his nephew Jehoiachin, who had rebelled against his master, Nebuchadnezzar, King of Babylon, and was besieged in Jerusalem, and taken prisoner, after a brief reign of three months. Nebuchadnezzar bestowed the vacant throne on Zedekiah, doubtless in the expectation of securing a faithful liegeman. But Zedekiah was a weak, unwise ruler, probably incapable of political fidelity: in the phraseology of the Jewish historian, 'he did that which was evil in the sight of the Lord.' Forgetting his obligations to the Babylonian monarch, he lent a ready ear to the boastful words of the nobles and princes of Judah, and, in spite of the earnest and reiterated remonstrances and warnings of the prophet Jeremiah, finally consummated his perfidy by forming an alliance with Egypt, the hereditary enemy of Assyria and Chaldæa. Swift destruction overtook him. A Babylonian army invaded and ravaged the country, besieged Jerusalem, and after inflicting a crushing defeat on an Egyptian force that was marching to the relief of the city, reduced the inhabitants to such horrible extremities that they could no longer hold out. Zedekiah, accompanied by his wives and children, fled in the darkness of night toward the Jordan, but was overtaken and made prisoner near Jericho. The monarch and his sons were sent to Riblah, at the n. end of the valley of Lebanon, where Nebuchadnezzar then abode. The conqueror, with the usual Asiatic cruelty, ordered the

sons to be slain before their father's face, and then deprived the wretched parent of his eyesight. Thus maimed, and bound with fetters of brass, he was conveyed to Babylon, where the tradition relates, he ground in a mill until he died. The temple and city were destroyed, the inhabitants carried off into captivity, and the kingdom of David and Solomon ceased to have a place on the earth.

ZEDOARY, n. *zĕd'ō-ā'rĭ* [Port. *zedoaria;* Pers. *jadwâr*]: the root of a plant resembling ginger, but of a sweet scent, used as a stimulant; the product of certain species of *Curcuma* (see TURMERIC), natives of the E. Indies. The ROUND ZEDOARY of the shops is the product of *Curcuma zedoaria,* native of both India and China; having palmate root-stocks, straw-colored within. LONG ZEDOARY is produced by *C. zerumbet,* native of various parts of the E. Indies; having long palmate root-stocks, yellow within. Zedoary is a powerful sudorific.

ZEEKOE, n. *zā'kô* [D., sea or lake cow]: name given by the Dutch colonists of s. Africa to the hippopotamus.

ZEELAND, *zē'land,* Dut. *zā'lânt,* or SEE'LAND: province of the Netherlands, consisting mainly of the islands Walcheren, N. Beveland, S. Beveland, Schouwen, Duiveland, Tholen, St. Philipsland, and Wolfaartsdyk; 51° 20′—51° 45′ n. lat., 3° 21′—4° 15′ 54″ e. long.; 689 sq.m. The boundaries are: South Holland on the n., the Easter Scheldt on the e., Belgium on the s., and the North Sea on the w. Nearly three-fourths of the people are Protestants, having 138 churches; the remainder, except 670 Jews, with 4 synagogues, are Rom. Catholics, who have 36 places of worship. The provincial capital is Middleburg (16,000). Other important towns are Flushing (12,000), Goes (pron. *hûs*), in South Beveland; and Zierikzee, in Schouwen. The greatest part of the soil, which is a rich clay, has been redeemed from the sea; and almost in the centre of Walcheren, South Beveland, and Schouwen, there are seen still the high mounds of earth called 'hills of refuge,' which the early inhabitants formed as places of safety for themselves and cattle when a high tide burst over the newly acquired lands. The number of Polders, or drained districts, in the province amounts to about 400. Zeeland is almost entirely arable, and produces the finest crops of wheat, barley, oats, rye, peas, beans, colza, beet, flax, hemp, canary-seed, mangolds, etc. Potatoes are extensively planted; and madder for the manufacture of dyeing material forms a valuable agricultural product. Horses, horned cattle, sheep, swine, and goats are the stock. In many districts of Zeeland, extensive orchards beautify the farms.

The neighboring seas abound with fish, and in Schouwen many eggs are collected, myriads of waterfowls resorting thither to make their nests. The principal industries, apart from agriculture, are preparing

of madder for the market, weaving calicos, rope-spinning, ship-building, beer-brewing, soap-boiling, making vinegar, salt, starch, tobacco, tile and brick, tanning leather, grinding corn, sawing wood, etc. The people of Zeeland are kind and hospitable; and in the country parishes are much attached to their fairs, meetings for merry-making, and other old customs, which might with advantage be given up. Few marriages take place among the agricultural portion of the population till absolutely necessary, yet cases of desertion are rare, as they would utterly disgrace the young man concerned.

A fine ship-canal through the island of South Beveland was opened 1866, taking the place of the Easter Scheldt. A railway from Flushing, through Walcheren and South Beveland, communicates with the main Belgian lines at Roozendaal, and by Breda leads to Rotterdam, Amsterdam, or Germany. Pop. (1900) 219,832.

ZEEMAN, Remigius: Dutch marine painter: b. Amsterdam about 1609; d. there about 1672. His real name was Nooms, but he received the name of Zeeman from painting marine subjects. There are a number of his works in the royal palaces at Berlin, where he resided for a number of years. He also produced several etchings of more than ordinary merit.

ZEGEDIN, Stephen de: Hungarian Protestant theologian: b. Zegedin 1505; d. Revin, Hungary, 1572. He studied under Luther and Melanchthon at Wittenberg, and taught and preached afterward throughout the cities of Hungary; was taken prisoner by the Turks, who treated him with great cruelty. Among his works were: *Speculum Roman Pontificum Historicum* (1602); *Assertio de Trinitate* (1573); *Tabulæ Analyticæ in Prophetas, Psalmos, et Novum Testamentum* (1592).

ZEGEDIN, Hungary: city in Csongrad, near confluence of the rivers Maros and Theisse. It is one of the largest towns in Hungary and has manufactures of woolens, leather, and toys. Being located adjacent to two navigable rivers, it controls the commerce of a large surrounding district. Pop. 35,000.

ZEGERS, Hercules: Dutch landscape painter: b. about 1625. He was an artist and engraver of great merit, but notwithstanding the general excellence of his works he found great difficulty in disposing of them, and, becoming discouraged, fell into habits of intemperance. After his death his works sold for very high prices.

ZEGERS, Tacite Nicolas: Flemish theologian: b. Brussels in the latter part of the 15th century; d. there 1559. According to all authorities he was one of the greatest critics of his time. Among other works he published an edition of the New Testament in Latin (1559).

ZEILA, Zaylah, or Sela, Northeast Africa: a seaport

of the British Somali Coast Protectorate, on the Gulf of Aden, a few miles s.e. of Jibutil, the port of French Somaliland. Its former commercial importance as the terminus of caravan routes from Harar and Shoa in Abyssinia, has diminished since the construction of a railroad from Jibutil to Harar. Pop. 12,000.

ZEILER, MARTIN: German geographer: b. Styria 1589; d. 1661. He was one of the foremost authorities of his time, and a voluminous writer on various subjects. He published some useful works on the geography and topography of Germany.

ZEILIN, *tsī'lĭn,* JACOB: commander of marines: 1806, July 16—1880, Nov. 18; b. Philadelphia. He was commissioned lieutenant of marines 1831; had active part in the defense of Monterey, Cal., 1846, and the conquest of that country; was brevetted major for gallantry in the action of San Gabriel river 1847; participated in the taking of Los Angeles and the battle of La Mesa; was in command of San Diego; and took part in the operations in that vicinity and at Mazatlan. Promoted to captaincy, he was on duty in the east; was fleet marine-officer in the Commodore Perry expedition to Japan; served at Norfolk, Va., 1854-57; was present and wounded in the first battle of Bull Run; commanded at the New York barracks 1862-3; co-operated at Charleston with the blockading ships 1863; was commandant at Portsmouth, N. H., 1864; and, commissioned colonel 1864, and brigadier-general 1867, of the marine corps, was thereafter at Washington, where he died, having retired from service 1876.

ZEIN, n. *zē'ĭn* [Gr. *zeia,* a species of grain]: the gluten of maize, a substance of a yellowish color.

ZEISBERGER, *zīs'bĕrg-ėr,* Ger. *tsīs'bĕrch-ėr,* DAVID: early Moravian missionary to the N. Amer. Indians: 1721, Apr. 11—1808, Nov. 17; b. Zauchtenthal, Moravia. Coming to this country 1740, he studied in the Indian school at Bethlehem, Penn., and among the Indian tribes, becoming acquainted with five languages, the Delaware, Onondaga, Mohican, Chippewa, and the Monsey-Delaware. No Indian missionary ever had greater success and influence. He labored at Shamokin and Onondaga 1745-52, until the breaking out of the French war. After this he was among the Connecticut and Moravian Indians; founded a mission on the Allegheny river 1767, on the Beaver (Friedenstadt) 1770, and on the Muskingum, O., 1772. All together, he established 13 truly Christian towns of Indians. He prevented the Delawares from joining the British Indian forces in the revolution. He followed the Delawares to Canada, and 1798 founded Goshen, O., where congress granted the Moravian Indians a tract of land. There he died. He published a spelling-book and hymns for the Delawares and lately his MSS. *Dictionary in German and Delaware,* and *Essay toward*

an Onondaga Grammar, have been printed (1887-8). He also left in MS. a *German and Onondaga Lexicon*, a *Delaware Indian Grammar*, and hymns and sermons. See *Life* by Bishop Sweinitz (1870), and *Diary of David Zeisberger* (1888).

ZEISE, HEINRICH: German poet: b. Altona (province of Schleswig-Holstein, Prussia) 1822, Apr. 19; d. . He was an apothecary successively in Altona and Copenhagen, and from 1863 to his retirement in 1875 was proprietor of a chemical manufactory at Altona. He finally settled in Grossflotbek, near Altona. During an extended journey through Norway, Sweden, and Denmark, he familiarized himself with Scandinavian literature, and subsequently he translated the writings of Oehlenschläger, Anderson, Holst, Jörgen, Moe and others, and works of natural history by Schouw and Oersted. Zeise's original verse is often careless in diction, but has generally a pleasing quality, and reaches a stirring note in his patriotic songs, many of which are among the more valuable in his collection of *Deutsche Kriegs- und Siegeslieder* (1864). Among his volumes are: *Reiseblätter aus dem Norden* (1848); *Gediehte* (2d ed. 1852); *Neuere Gediehte* (1850); *Kampf- und Schwertlieder* (1849); *Kleine Lieder* (1871); *Aus dem Leben und den Errinnerungen eines Nord-Deutschen Poeten* (1888); *and Natur- und Lebensbilder* (1892).

ZEISING, ADOLF: German writer on æsthetics: b. Ballenstedt (Anhalt) 1810, Sept. 24; d. Munich 1876, Apr. 27. He wrote *Neue Lehre von den Proportionen des menschlichen Körpers* (1854); *Æsthetische Forschungen* (1855); *Religion und Wissenschaft* (1873); and several works of fiction. For a time he held a professorship in the Bernburg (Anhalt) gymnasium, but after 1853 devoted himself to letters, residing generally in Munich.

ZEITGEIST, n. *tsīt'gīst* [Ger.]: the spirit of the time.

ZEITUN, or ZEITAN: Asiatic Turkey, a town in the province of Aleppo, 25 m. n.w. of Marash, in an iron-mining district, inhabited chiefly by Armenian Christians. The district is fertile but mountainous. The people, distinguished by their martial spirit and their immunity from crimes of violence, are descendants of the Armenian kingdom which existed in Cilicia from the 11th to the 14th century. A sanguinary conflict with Turkish troops soon after the Crimean war drew European attention to the community, and it was stopped by the intervention of the British and French consuls. In 1878, 1890, and 1895 they defended themselves successfully from Turkish oppression, securing favorable conditions of peace. Pop. 20,000.

ZEITUNLI, *zī-tûn'lî:* a native or inhabitant of Zeitun.

ZEITZ, *tsīts:* walled town of Prussian Saxony, govt. of Merseburg; on the Thuringian railway, 23 m. s.w. of

Leipzig; in a pleasant and fruitful district, on a steep slope, on the right bank of the White Elster, over which there is a stone bridge. The town is very ancient, and has some good old public buildings; a cathedral and four other churches; a good library of 12,000 vols., besides MSS.; asylums for orphans and lunatics, an old and new castle, etc. There are manufactures of cotton, earthenware, leather, calicos, hosiery, gloves, etc.; and several print-fields, breweries, and distilleries. In the neighborhood are extensive mineral-oil works.—Pop. (1900) 27,391.

ZEL, or ZELL, n. *zĕl* [Pers.]: an eastern instrument of music of the cymbal kind.

ZELA: an ancient town of Asia Minor; in the Pontus, where Julius Cæsar defeated Pharnaces, king of Pontus and son of Mithridates, and announced his victory to the Roman Senate, in the famous brief despatch, *Veni, vidi, vici*—'I came, I saw, I conquered.' This battle ended the war; Pharnaces escaped into Bosporus, where he was slain by his lieutenant, Asander; Pontus was made a Roman province, and Bosporus was given to Mithridates of Pergamus, 47 B.C.

ZELAYA, JOSE SANTOS: Nicaraguan statesman: b. Managua, Nicaragua, about 1845. Educated in England, he entered the Nicaraguan army and was made a general in 1885. He became the leader of the Liberal party and united with Joaquin Zavala in the revolt of Apr.-June 1893, which resulted in the overthrow of President Sacaza. When Zavala was made provisional president Zelaya rebelled and Zavala was obliged to resign. A new constitution was then proclaimed, under which Zelaya was elected president 1893, Sep. 17. In the next year he invaded the Mosquito territory and in 1895, May, an English force held the port of Corinto for a short time until Nicaragua agreed to pay indemnity for the murder of an English subject.

ZELAYA, Mexico: a town of Guanajuato, on the Rio Grande de Santiago, 120 m. n.w. of Mexico City. It is a cotton manufacturing centre. The chief buildings are a large and elegant cathedral and several convents. Pop. 10,000.

ZELKO'NA TREE: a large elm-like tree (*Planera richardi*), native to the Orient. The timber is much prized, the heartwood when dry being exceedingly hard, capable of a fine polish, and an excellent furniture wood.

ZELL, KARL: German philologist and archæologist: b. Mannheim, Baden, 1793, Apr. 8; d. Freiburg-im-Breisgau, Baden, 1873, Jan. 21. He studied in Heidelberg, Göttingen, and Breslau, was made professor of philology at Freiburg in 1821, and, as representative of the university in the first Baden chamber in 1831-5, secured a reorganization of the system of higher education in the grand duchy. He was made a member of the council for

higher studies, with the title of ministerial councilor. From 1846 until his retirement in 1855, he was professor of archæology at Heidelberg, where his lectures were very inclusive in their scope. His scholarship is amply shown by his studies of Aristotle and the Aristotelian philosophy. He was prominent in the Catholic Church, and president of the assemblies of the Catholic Union in 1852 and 1853. Among his writings are: *Observationes Criticæ dc Aristotele* (1817); *Ethica Nicomachea* (1820); a translation (1834) of the *Organon; Bilder aus der Gegenwart* (1855); and some *opuscula academica.*

ZEL'LE, or ZELL. See CELLE.

ZELLER, *tsĕl'ĕr,* EDWARD: German theologian and historian of philosophy: b. Würtemberg, 1814. He studied theology at Tübingen and Berlin, and became one of the ablest and most pronounced of Baur's disciples (see BAUR); hence his call to a theological chair at Berne 1847 aroused strong opposition from the orthodox. In 1849 he was removed to Marburg; 1862 became prof. of philos. at Heidelberg, and 1872 at Berlin. He retired in 1895. Latterly he has almost confined himself to philosophical studies. Among his writings the following are the most important: *Platonische Studien* (1839); *Die Philosophie der Griechen,* his greatest work (1844-52; 4th ed. 1876-81); *Das Theologische System Zwinglis* (1853); *Die Apostelgeschichte kritisch Untersucht* (1854; English trans. 1875-76); *Vortrage und Abhandlungen* (1865; 2d ed. 1875-77-84); *Staat und Kirche* (1873); *David Friedrich Strauss* (1874); *Geschichte der deutschen Philosophie seit Leibnitz* (1872); *Friedrich der Grosse als Philosoph* (1886). His work on Greek philosophy has been translated into English under the titles *Socrates and the Socratic Schools* (1868); *Stoics, Epicureans, and Sceptics* (1870); *Plato and the Older Academy* (1876); *The Pre-Socratic Philosophy* (1881); *The Eclectics* (1883); *Aristotle* (1897).

ZEMINDAR, n. *zĕm'ĭn-dâr'* [Pers.—from *zemin,* land, and *dar,* holding]: in *India,* a feudatory or landholder under government. ZEM'INDARY, n. *-dâ-rĭ,* or ZEM'INDAREE, n., or ZEM'INDARI, n. *-rē,* the jurisdiction or district of a zemindar.—*Zemindars* under the Mogul rule in India were the governors of districts or large towns. Many of them occupied in India a position almost similar to the dukes and counts of w. Europe in the middle ages; they received from their superiors, who were the nabobs or provincial governors, fiefs of more or less extent, for which they paid a certain due annually, being then exempted from all other imposts.

ZEMSTVO, *zĕmst'vō:* a Russian elective provincial assembly, composed of landed proprietors and representatives of the peasants and working classes. It was established in 1864, by Alexander II., in a few of the most

advanced provinces of Russia, for the general administration of local affairs, subject to the veto of the imperial governors. The representatives were originally elected by the landed proprietors, town householders and the peasantry, but in 1890 a law was promulgated by the Czar reducing the number of representatives, limiting their powers, and increasing the authority of the landowners. At no period of its existence was the Zemstvo ever allowed to exercise any actual influence in the conduct of the government; it was evidently a mere pretence of local administration to allay the dissatisfaction of the people. Among its supposed duties were the imposition of local taxes, the regulation of matters of education, public health, the roads, etc. In some respects it resembled the municipal boards of constitutionally governed countries, but it had no independent authority, and its acts could be set aside at any time by the veto of the imperial governors. The national body was composed of a representative from each district, and one also from each province; and the Zemstvo which assembled in St. Petersburg in 1905 and was dispersed by the royal troops, was made up in that manner. Among the representatives were a number of noblemen, of the more liberal kind, willing and anxious to uplift the peasantry and inaugurate better social conditions by extending the franchise and introducing a general system of public education. The threatened revolution which succeeded the dispersion of the Zemstvo induced the Czar, in 1905, Aug. 19, to issue a proclamation convening the Duma (q.v.), or National Assembly, which met in St. Petersburg May 10, 1906. Contrary to the expectations of the imperialists, and much to their chagrin, the returns from the elections showed that a large majority of the members of the Duma were constitutional democrats, and the boldness which they manifested in their subsequent proceedings amazed not only Russia, but the entire civilized world.

ZENANA, *zē-nâ'na:* name of apartments devoted to women in the houses of India. In houses of the better classes, the front is occupied by men, and the rear, behind an open court, is assigned to women; the latter portion of the house is very inferior in the size and furnishing of the rooms. The number of married women, each with a separate husband, is often large (the sons being married early), and each occupies one small room, where she rears her children and lives a life much like that of a prisoner, though she can visit other rooms of women and the separate woman's court. The rooms have uncarpeted brick floors and are uncleanly; matting forms the bedding on a bedstead, while other appliances are few. The first story is used for work-rooms and cattle-stalls. A woman is not permitted to go abroad, except hidden in a palanquin, to pay a visit to her father's house. She learns no arts, except to cook.

ZEND, n. *zĕnd:* the anc. Persian tongue—the language of the Avesta or the ancient sacred books attributed to Zoroaster (q.v.). When the Avesta first became known through Anquetil-Duperron (q.v.), many scholars of eminence, like Jones, Meiner, Henning, Erskine, and others, warmly contested the age of these writings. They held that the idiom in which they were couched had never been spoken in any part of Persia, but was a Sanskrit dialect introduced from India for sacred use. The so-called Zoroastrian writings, they said, dated from the time of Ardeshir-Babegan, the first Sassanian, B.C. 230, or had at least been rewritten and redacted at that time. The first who endeavored to lay the foundations for a real grammatical knowledge of Zend was Rask, the Dane, who 1816 undertook a journey to India and Persia, to make researches into the origin and nature of this language on the spot. Though he did not live to make known all the results of his investigations, he yet proved that the sacred language of the Parsees was closely connected with that of the Brahmans; in other words, that Zend was akin to Sanskrit, and that, like the latter, it had retained some of the earliest formations of the Aryan dialects. Eugène Burnouf followed in his steps. He was indeed the real founder of Zend studies in modern Europe. By the aid of his knowledge of Sanskrit and comparative grammar, he proceeded to decipher, for the first time, the sacred writings of Zoroaster in the original; while Anquetil-Duperron, who first made the *Zend-Avesta* known in a European garb, did so from a modern Persian translation. Both he and Bopp contended for the independent and ancient existence of Zend, holding that Sanskrit, being a new language which came from the north, was more likely to be derived from the Zend than the Zend from Sanskrit. The opinion of Haug, the latest investigator, is, that Zend is almost identical with the most primitive—the Vedic—form of Sanskrit. The following sketch gives the results of his studies.

Zend, in its widest sense, embraces two so-called 'Bactrian' dialects, which, with the 'West Iranian' languages, i.e., those of ancient Media and Persia, form the stock of Iranian tongues. These tongues were spoken anciently in what the *Zend-Avesta* calls the 'Aryan countries' (*Airyâo danhâvô*). The former, the 'East Iranian' or 'Bactrian' branch, has survived, in its two dialects, in the scanty fragments of the Parsee Scriptures only. The more ancient of them is called the 'Gâtha dialect,' because the largest and most important pieces preserved in this peculiar idiom are the Gâthas, or songs; the younger or 'ancient Bactrian,' also 'classical Zend language,' is the one in which the greater part of the *Zend-Avesta* (q.v.) is written. Both dialects seem to have died out B.C. 3d c., leaving no linguistic progeny. The general character of Zend, in its widest sense, is that of a highly developed idiom, inasmuch as it is as rich in inflections (there are no less than three numbers and eight cases) as is the Vedic Sanskrit, and is richer even than the Latin in the variety

of forms inherent in its verbs and nouns. There are numbers of compound words in it; and the whole syntax bears the stamp of an advanced stage of linguistic progress. A genuine sister of Sanskrit, Greek, Latin, and Gothic, it is yet known to us, much as is the Hebrew, in only its declining phase. The forms are no longer accurately kept distinct, and a return to the originally uninflected state is noticeable, principally in the verbs. It may be that the Bactrian grammar had never been properly fixed by rules, and that, in the absence of that tender care which the Brahmans took of the preservation of the Sanskrit texts and idiom, many corruptions and abbreviations gradually crept from the colloquial into the classical language of Zend, and were thus perpetuated in the surviving remnants. As soon as the language of the Zoroastrian books died out from daily use, these books were mechanically copied, time after time; and numerous blunders, unchecked by an understanding of the structure or the details of the language, crept in unheeded. The oldest copies are the best, comparatively speaking: the more modern the copy, the oftener the terminations are found as separate words; vowels are inserted according to the faulty pronunciation of the writer; and a number of other faults of omission or commission are patent at first sight, due solely to carelessness and ignorance. The two dialects of Zend differ both phonetically and grammatically; and the phonetical differences are so great that at first sight it appears almost as if they were caused by different localities rather than different ages; but closer inspection shows that the singing of the Gâthas, whereby certain vowels were lengthened, has caused many of these striking peculiarities. Grammatically, the Gâtha dialects hows many deviations from Zend, traceable to the more primitive state of the Bactrian language which it represents. But the differences between the two are not so great as between the Vedic and the classical Sanskrit, and between the Greek of Homer and the Attic dialect. At most, the Gâtha may be reckoned one or two hundred years older than that classical Zend which formed the classical language of the ancient Iranian empire, as depicted in the earlier parts of the *Shâh Nâmeh*.

There are 12 simple vowels and about 14 diphthongs in Zend, for each of which there are special characters. Of vowels peculiar to this idiom may be mentioned the *ã* (long, with nasal sound), used chiefly in the genitive plural termination; further, the *ē*, which, in the Gâtha dialect, often replaces the final *ô* of the usual Zend, and which, by the frequency with which writers confound it with *î*, also proves itself closely allied to that sound. There is, further, an initial *a*, which probably crept into the Zend texts when they were transcribed into their present characters, which are doubtless drawn from the Syriac. This *a* corresponds to the Aleph prostheticon of the Semitic idioms. Again, the short vowels are always lengthened at the end of a word in the Gâtha dialect: owing probably to the fact that the Gâtha literature—the most sacred hymns—was sung, and the singer's voice resting upon the final

vowel, whether long or short, had the effect of lengthening it even in the MSS., written mostly from memory. Of consonants there are 6 gutturals, 2 palatals, 4 dentals, 3 labials, 4 semi-vowels, 5 sibilants, 5 nasals. The roots are mostly monosyllabic, consisting occasionally of one vowel only, or being a combination of a vowel with a simple or double consonant, or of two consonants with a vowel between them—e.g., *i*, to go: *dâ*, to give; *gâ*, to go; *mere*, to die; *ar*, to be; etc. Additional sounds added to the simple roots enlarge and otherwise change the meaning of a word—*dâ*, to make, becomes, by the addition of *th*, *dath*, to place; from *mere*, to die, is derived *mereñch* to kill. Three chief modifications are noticed in the verbal roots, irrespective of tense and mood—viz. the 'causal form,' expressing the idea of 'to make,' 'to get made,' which is formed by lengthening the vowel of the root, and adding the syllable *aya*, as in Sanskrit. Next stands the desiderative form, expressing the wish of obtaining anything, which is formed by reduplication of the first syllable, and addition of *s* to the crude form before the terminations. The last or intensive form, used to render the verb more emphatic, was produced originally by simple reduplication of the root and the termination; afterward only the vowel of the first part was lengthened, and the consonants following were omitted. Three voices—the active, middle or reflective (L. deponent), and the passive—obtain in Zend, as in Greek and Sanskrit; and there are four chief moods, which may be used in all these three voices—the indicative, subjunctive, potential, and imperative. The subjunctive is of double nature, one expressing the 'might, would, or should,' the other the 'may'—a feature lost in classical Sanskrit, and met in only the ancient language of the Vedas. The potential, too, is of two kinds, corresponding to the Sanskrit 'potential' and 'precative.' There are as many tenses in Zend as in Sanskrit, though fewer than in Greek, which is in this respect the richest of the Aryan stock. There may be distinguished one formation for the present, four for the past, and two for the future.

The general scheme of the (active) present and imperfect is as follows:

PRESENT.	IMPERFECT.
Active Voice.	*Active Voice.*
Sing. 1. mi.	Sing. 1. m.
2. hi.	2. s, ô.
3. ti.	3. t.
Dual 1. vahi.	Dual 1. âva.
2. (lost.)	2. (lost.)
3. tô, thô.	3. tem.
Plur. 1. mahi.	Plur. 1. ma.
2. tha, dûm.	2. ta.
3. ñti.	3. en, añ.

The division of the 'crude' forms into ten classes, in use with the grammarians of Sanskrit, is also fully applicable to the Zend. Additions and reduplication make up the distinguishing features. The past tenses are likewise formed, as in the sister tongues, by augmentation, reduplication, or

composition. Apart from forms identical with those in Sanskrit, Greek and Lithuanian, Latin, and the ancient Teutonic languages, we find the use of two kinds of subjunctives. Equal richness of forms is found in the participle and the infinitive, while there are fewer gerundial forms than in Sanskrit. Nouns are formed out of roots by addition of suffixes, which generally correspond to those of the cognate languages. There are three genders in Zend—masculine, feminine, and neuter. The comparative and superlative are formed very nearly as in Sanskrit and Greek. The number of compound nouns in Zend is somewhat less than in the Sanskrit and Greek, on account of its standing nearer the more simple Vedic idiom. There are three numbers and eight cases of inflection for singular and plural of nouns; while there are no less than five cases in the dual, no other Aryan language having retained more than three. The terminations of the cases (in words ending with a consonant) are somewhat according to the following scheme:

	SING.	DUAL.	PLURAL.
Nom.	s.	a.	ô (aç).
Accus.	em.	a.	ô, ãs
Instr.	a.	bya.	bis.
Dat.	ê.	bya.	byô (byaç).
Ablat	at.	âo.	byô.
Gen.	ô (aç).	âo.	ãm.
Locat.	i.	yô.	aêshu, aêshva, hva.
Voc.	= Nom.	"	

There are pronouns of only the first and second persons found in Zend, the third person being made up by a demonstrative pronoun. There are some older forms found in the Gâtha dialect only. Most of the pronouns resemble closely the Sanskrit forms. The relative is used sometimes as a demonstrative. The numerals from 1 to 10 are: aêva, dva (va, dugê, ayê), thri, chathware, poñcha (meñda), khshvas (khshvîdem), hapta, asta, nava, daça. The following numbers are formed by addition of the single cardinal numbers to the ten or daça: 20 = vîçaiti, 100 = çatem, 200 = duye çaitê, 1,000 = hazanra, 10,000 = baêvare, 100,000 = ahôkhsta. The ordinals are: paoirya, first; bitya, second; thritya, third; khtûiryah, fourth; pukhdha, fifth; etc. 'Multiplication numerals' are formed by addition of *keret* and *vat*—e.g., hakeret, once; bizhvat, twice; thrizhvat, thrice; etc. Particles and prepositions are often identical with those of Sanskrit. The latter may be separated from the verb, if forming part of it, as is the case in the Vedic and Homeric languages but not in classic Sanskrit or Greek.

We have started with the now fully proved assertion that Zend is closely allied to Sanskrit, especially to the ancient Vedic dialect. To the latter it bears about the same affinity which the different Greek dialects (Æolic, Doric, Ionic, Attic) bear to one another. The ancient Brahmans and the Parsees are but two tribes of the nation which is called Aryas both in the *Veda* and *Zend-Avesta*, the former somewhat to be compared to the Ionians, the latter to the Dorians. But in comparing Zend with San-

skrit, it is noticeable that it resembles more the primitive Vedic than the classical Sanskrit. In verbal forms, chiefly moods and tenses, the classical Sanskrit is much poorer than it is in its primitive Vedic phase, having lost various forms of the subjunctive mood, most tenses of all other moods except indicative, the manifold forms expressing the infinitive mood; while all these are found completely preserved in the *Vedas*, *Zend-Avesta*, and Homeric Greek. These and many other signs indicate that the classical Sanskrit was formed long after the separation of the Iranians from the Hindus. The differences between the Vedic, Sanskrit, and Zend are very minute in grammar, but important both phonetically and lexicographically, like the difference between German and Dutch. But the philologist can easily transform, by slight phonetic changes, the Zend word into the Sanskrit one. A striking proof of the original identity of grammatical forms between the two is seen in their both exhibiting certain identical irregularities.

For *Zend Literature*, see PERSIAN LANGUAGE AND LITERATURE: ZEND-AVESTA. We here mention only the principal items. At the head stand the five Gâthas, which may safely be ascribed to Zoroaster and his disciples themselves. There is no doubt that what now survives is but a scanty fragment of this literature. Probably they but represent a selection of verses considered most efficacious for putting down evil influences, and for increasing the welfare of the Zarathustrians. The Gâthas, as they now stand, may be compared to the Sâmaveda, which contains selections from the Rigveda, used at the Soma sacrifices. Next in order stand the Yasna, or seven chapters, containing songs and prayers, which dates from a much later period; and here again the first portion, or 'Younger Yasna,' is of still later date; and on the same line stands the Visparad, the collection of prayers called 'All Heads,' in 23 chapters. The Vendidad, on the other hand, represents conversations held by Zoroaster with Ahuramazda on religious topics, and is most likely the work of the high-priests of the Iranian community of later periods. The Yashts, or songs and conversations, are the latest. The age of the different works mentioned is fixed by Haug in the following manner: the Gâthas about B.C. 900 or 1200; the larger portion of the Vendidad at about B.C. 900 or 1000; the younger Yasna, about B C. 700–800; the latest part of the Vendidad (the Pazend) being written as late as B.C. 500, when the collection of the different parts also seems to have taken place. This computation would give the Zend, or rather the famed Parsee literature, a range of about 800 years, B.C. 1200–400. Cf. Haug's *Essays on the Religion of the Parsees* (Bombay 1862).—See PERSIAN LANGUAGE AND LITERATURE: ZEND-AVESTA: ZOROASTER.

ZEND-AVESTA, *zĕnd-â-vĕs'tâ*, or (as the Pehlvi books have it) AVESTA-ZEND: the sacred writings of the Parsees (q.v.). The word Avesta (*avasthâ*) means text, scripture; Zend, or Zand, translation or commentary *and* paraphrase. According to the latest researches, it seems that only a small portion of the entire collection now extant was formed of Avesta or text, the rest being made up of Zend or commentary, without text. The term Zend has indeed changed its meaning repeatedly. From an authoritative interpretation, emanating from the highest source, in time becoming embodied in the text itself, it came later to denote a translation into the native idiom of Persia (the Pehlvi), made by the Zoroastrian priests during the Sassanian period. There is further a special 'Zend doctrine' to be noticed, which differs considerably from that contained in the Avesta. A still further explanation of that Zend doctrine is the Pâzend, a word often met in connection with Avesta and Zend. Of this we shall further have occasion to speak.

Before proceeding with an elucidation of the contents and purport of these Zend writings, we glance at their history, or rather at the different phases through which the acquaintance with them on the part of the West has passed. The doctrine of the 'Magi,' as the ancient world was wont to call the priests of Zoroastrianism, as well as those of India, Persia, and Babylonia, is alluded to first in the prophecy of Jeremiah, where the chief of the Magi is mentioned among Nebuchadnezzar's retinue. In the new Test. (Matt. ii. 1), Magi come to worship the Lord Jesus at Bethlehem. The earliest account among Greek writers is furnished by Herodotus, who, on the whole, seems well informed for his time. Besides his account we hear of accounts by Ctesias, the Greek physician of Artaxerxes II., by Deinon, Theopompos, and Hermippos; but only fragments from their writings have survived, imbedded chiefly in Plutarch and Diogenes Laertius. Pliny, Strabo, Pausanias, Dion Chrysostomus further enlarged the stores of knowledge, which, more or less trustworthy, may be gathered from independent sources. Omitting later Greek writers, such as Damascius, Theodorus of Mopsuestia, etc., we turn to Armenian writers of the 5th c.: among them we find Eznik and Elizæus, from whose records we gather that the Zoroastrians at their time were split into two parties, one called Mog, the other Zendik; the former inhabiting chiefly the western parts—Media and Persia principally acknowledging the Avesta; while the latter, living principally in the east (in Bactria), followed the traditional explanations, or Zend proper. To the Arabic writer Masudi (950) we owe a comparatively correct account of the sacred book; while Sharastani (1153) is perhaps the first among his countrymen who ranks the Zoroastrians with those other professors of Semitic creeds, the Mohammedans, Jews, and Christians, and not among the idolaters and pagans. In his time they were already split into many sects, those who believed in the transmigration of souls, like the Brahmans, Buddhists, etc. As a successful piece of deception, it is to be noticed that Mohammedan writers mostly seem to

countenance the fable palmed upon them during the times of persecution by the Magi, that Zoroaster was identical with Abraham—in which there is not one atom of truth. The nations of modern Europe came into contact with the adherents of Zoroastrianism in w. India, and in the 17th c. some MSS. of their sacred books were brought to England, but no one was able to read them; and Hyde himself, the celebrated Oxford scholar, was unable to make any use of them when, 1700, he wrote his learned work on the Persian religion. A sort of romantic freak first put Europe in possession of the key to this book, whose language had been lost more than a thousand years. A young Frenchman, Anquetil-Duperron, happened to see a few pages that had been copied from a Zend MS. in the Bodleian Library, and he instantly resolved to betake himself to India in quest of the original Zend writings. To achieve this purpose, he, being without means, had to go as a sailor on a ship belonging to the French India Company, bound for Bombay 1754. The French govt., however, soon afterward took part in the affair, and furnished him both with money to purchase MSS., and with a pension, that he might pursue his studies with greater ease. He prevailed on several of the dusturs, or learned priests, to introduce him into the mysteries of the holy language and rites, and further to sell him some of the most valuable works couched in it. When he considered himself sufficiently competent in Pehlvi and Zend, he commenced a translation of the whole Zend-Avesta in French 1759. Two years later he returned to Europe; and having convinced himself, by comparison with the Oxford MSS., that those he had acquired of the sacred writings were genuine, he went to Paris, where he deposited his treasures—180 MSS. in different oriental languages; and published, ten years after leaving India (1771), the first European translation of the Zend-Avesta, to which was added much supplementary matter. The work created a profound sensation throughout Europe; but after a while voices began to be heard less favorable than had been anticipated by the bold and persevering discoverer. Apart from the objections raised against the new book by Immanuel Kant the philosopher, on the score of its not containing any traces of philosophy, a much graver question was ventilated in England—viz., that of its authenticity. It was not that Anquetil was charged with forgery, but the priests, it was said, had found in him a ready dupe. It was principally Sir William Jones, who, in a trenchant letter addressed to Anquetil-Duperron (in French, being, as Sir William Jones said, the only language which Anquetil understood—*a little*), tried to prove the utter untrustworthiness of the whole work. He was aided therein by Richardson, Persian lexicographer, who, from four reasons—none of which however, is valid—came to the conclusion that the book was a spurious fabrication. While in France there was but one opinion on the subject—viz., that English scholars were trying to run down the work out of sheer spite and jealousy, the opinions of Germany were rather divided. Some, like Meiners and Tych-

sen, fully acceded to the proofs arrayed against it; but there arose another renowned German scholar, Klenker, who, in token of his complete and unreserved trust in the genuineness, set about translating Anquetil's French translation into German, adding several appendices, etc., and principally pointing out the now generally recognized agreement between the more important heads of the doctrines as contained in the book and in the classical writers. Thus matters stood for a long while. In Germany Anquetil's translation, as rendered by Klenker, became the standard work even for theologians; in England, none any longer thought about it, full agreement having been reached by the highest authorities that it was nothing but a clumsy forgery. More than 50 years had elapsed from the appearance of that work, when a Dane, Rask, undertook to look into the matter. Having himself acquired many Zend and Pehlvi MSS. in Bombay for the Copenhagen library, he wrote (1826) a pamphlet, in which he first showed not only the close affinity between the language of the Zend-Avesta and Sanskrit—which had been pointed out by Erskine and others before; and further proved it to be, not a corruption of Sanskrit, but a distinct language. He proved also that modern Persian was derived from Zend, as Italian from Latin—a step which at once removed all doubts about the genuineness of the work, while showing how, to a certain extent, Anquetil, to whom high praise was due for having been the first pioneer, had, through the absence of the requisite philological aids, been occasionally wofully misled in his version. The learned dustur himself—with whom Anquetil communicated only in Persian—though well acquainted with the Parsee traditions, and favoring mostly the general sense of the passages, yet had no grammatical knowledge whatsoever of the language that he pretended to teach. Rask had pointed out the way; Eugène Burnouf followed it. He indeed may be called the founder of Zend philology. For more than 20 years this eminent scholar devoted all his energies to elucidating, commenting, and discussing this language and the sacred writings couched in it, and in publishing texts and translations. In Germany, Olshausen, Bopp, Müller, Brockhaus, Spiegel, Haug; in Copenhagen, Westergaard, have been busy ever since in editing and translating either portions of or the entire Zend Avesta; and though the rediscovery of the language is far from accomplished, yet their indefatigable labors have given us the key to the facts connected with the language and its sacred depository, the Zend-Avesta.

We turn to the book itself. We know, both from the Parsee traditions and from independent classical witnesses, that the Zend-Avesta was originally of vast extent, incomparably vaster than the work that now exists under that name. Pliny speaks of 2,000,000 verses composed by Zoroaster; and an Arabic writer, Attavari, mentions the number of 12,000 cowskins (parchments) of which Zoroaster's writings consisted. No doubt these are round Eastern figures; but it may safely be assumed that the sacred liter-

ature in question must have been of very great extent. The Parsees ascribe its loss to Alexander the Great, but it is more likely that their traditions in that respect refer to the Mohammedan conquests. Yet even then the greater part of the sacred literature was already lost, and the date of Alexander may so far be correct, that the Greek ideas that followed in his wake turned the believing minds from the primitive faith, and carried with it a gradual neglect and loss of the documents in which it was contained. For 500 years —from the Macedonian conquest B.C. 335, to the accession of the Sassanians to the throne of Iran A.D. 235—the Zoroastrian religion was not supported by any kings, and decayed in consequence. But when the Sassanians assumed the rule, their principal endeavors were directed to the revival of the ancient faith; and their unceasing researches after the ancient fragments of the Zoroastrian gospel have resulted in the small collection which we now possess. Yet the names and the summaries at least of all or most of the lost portions have survived. The whole scripture is reported to have consisted of 21 nosks, or parts, each containing Avesta and Zend—that is, text and commentary on it. The number 21 was to correspond to the 21 words of which the most sacred prayer of the Zoroastrians (the Honovar) was composed. The 1st of these sections comprised 33 chapters, containing the praise and worship of angels; the 2d (22 chapters) contained prayers and instructions to men about good actions; the 3d (22 chapters), an explanation of religious duties and commandments, and the way to avoid hell and acquire paradise; the 4th (22 chapters), knowledge of both this and the future worlds and their inhabitants, revelations concerning heaven, earth, water, trees, fire, men, and beasts, the resurrection of the dead, and the passing of the bridge Chinvat; the 6th (35 chapters) treated of astronomy, geography, astrology; the 7th (22 chapters), of food, lawful and forbidden; the 8th (50 chapters, of which, at the time of Alexander, only 13 were extant) treated of the different head or chiefs in the creation; and the 9th (60 chapters) contained a code of laws for kings, governors, etc.—also a portion about the sin of lying; the 10th (60 chapters) treated of metaphysics, natural philosophy, divinity, etc.; the 11th (60 chapters) treated of the reign of King Gustasp, and his conversion to the religion, and its propagation by him through the world; etc. Of all the 21 nosks, however, one only, the 20th (in 22 chapters), called the Vendidad, has survived complete. This treats of the removal of uncleanliness of every description, from which great evils arise in the world. Some fragments of the other parts only, chiefly the 4th and 11th, have survived. But there are now in sacred use among the Parsees other books either not included in the foregoing list, or imperfectly indicated in it. Of the former are the Yazna (Izeshne) and the Visparad (Visporatu). To the latter class belong 24 sections called Yashts, and some small prayers of different kinds, such as Afrîgân, Nijâyish, Gâhs, and Sirozah, or Calendar. As to the authorship of these books, to which we now proceed, see further ZORO

ASTER. By unanimous consent of both classical writers and the Persians, the whole bulk of the sacred literature is ascribed to Zoroaster himself. They were supposed to be the substance, or, as was held afterward, the very words of revelations from God to the prophet, in the form of conversations. These revelations do not appear to have been at first committed to writing, but to have been orally preserved by his disciples and adherents, and to have been handed down by them to posterity. Surprising as this may seem at the sight of what has remained, as at the thought of the infinitely larger bulk of what has perished, it must be borne in mind that, e.g., the Vedas, the Talmud, and the Sunnah have been preserved equally faithfully in the mouths of many generations. The name Zoroaster or Zarathustra—in as far as to him is ascribed the authorship of the whole of the sacred writings—is to be taken collectively rather than individually, i.e., as indicating a school of successors and high-priests of the founder, who is designated Zarathustra *Spitama;* while the chief divines who took his place in their after-times were called only Zarathustra. That their decisions and sayings were afterward 'hedged in' with the same reverence as those of the founder himself, need not be argued at length. All that can really be held to emanate from the prophet himself are the five *Gâthas*, which form part of the *Yazna* [Skr. *yajna*, sacrifice]. This Yazna consists principally of prayers to be recited at the sacrificial rites—such as the consecration of the Zoŏthra, or holy water; of the Bareçona, or bundle of twigs of a particular tree; the preparation of the sacred juice of a plant called homa—the Indian SOMA (q.v.)—taken to be an emblem of immortality; the offering of certain cakes; etc. The whole of the Yazna now comprises 72 chapters, probably corresponding to the (12 times 6) 'seasons' during which Ahuramazda created the world. It consists apparently of two parts belonging to different periods. The older is written in what Haug calls the Gâtha dialect (see ZEND), and was considered sacred even at the time when the other books of the Zend-Avesta were composed. This 'older Yazna' was divided again into the Gâthas and some minor pieces. The former, five in number, are small collections of (metrical) sacred prayers, songs, and hymns, exhibiting philosophical and abstract thoughts about metaphysical subjects. The name itself signifies 'song.' Their metre resembles chiefly that of the Vedic hymns. They are without rhymes, and only the syllables are counted. The first bears the heading (which is intended also for the other four), 'The Revealed Thought, the Revealed Word, the Revealed Deed of Zarathustra the Holy; the Archangels first sang the Gâthas.' They all are more or less devoted to exhortations by the prophet to forsake polytheism (the devas, or gods), and to bow only before Ahuramazda. The difference between monotheism and idolatry is pointed out in the respective sources whence they flow—viz., 'existence' and 'non-existence.' The mission, activity, and teaching of Zoroaster are presented more or less in all Gâthas, but chiefly in the

second. To the other portion belongs further the 'Yazna of seven chapters,' which seems to have been composed by early disciples, and which consists of prayers in prose, addressed to Ahuramazda, the angels, the fire, the earth, the waters, and other spiritual beings—genii presiding over different parts of the good creation; further, over devotion, speech, etc. There is also a chapter containing a formula by which the ancient Iranians were received into the new religious community. The so-called younger Yazna, written in the common Zend language, is of more varied contents, such as an invitation to Ahuramazda and all the good spirits to be present at the sacrifice; further, pieces referring to the preparation and drinking of the homa juice; next, the praises of the genius Serosh, and a commentary on the most sacred prayers. The *Visparad*, which forms the next most important part of the Zend-Avesta contains a collection of prayers, composed of 23 chapters, written in Zend (not Gâtha), and resembling the younger Yazna. They refer to the same ceremonies—the preparation of the sacred water, consecration of certain offerings, etc. Next are to be considered the *Yashts*, in 24 divisions. Yasht (*yêsti*) means worship by prayers and sacrifices, and in the Avesta indicates certain laudations of sacred persons and objects—yazatas (*izad*) = angels; and so far differs in nature from the invocations in the Yazna and Visparad, that, while in the latter the divine beings are invited promiscuously, the single Yashts are addressed to individual numina, such as the archangels, the sun, the heavenly water, the star Tisfrya, etc. In these songs—the work of Median bards, probably—are found also the primary sources of the legends contained in the Shâh-nâmeh (q.v.). Some minor pieces are now used as common prayers by the Parsees, such as the five *Nîjâyish*, or praises, addressed to the sun, the moon, the water, and the fire; the *Afrîgâns*, or blessings to be recited over a certain meal prepared for an angel or a deceased person; the five *Gâhs*, or prayers to the angels set over the five different times of the day and night; and finally, the *Sîrozah*, or 30 days, being a calendar, or rather an enumeration of the 30 divine beings that preside over each of the days: it is recited chiefly on the 30th day after a person's death. The *Vendîdad*, to which we now turn, is the 'Pentateuch' of the Zoroastrian canon, the code of religious, civil, and criminal laws of the ancient Iranians. It consists of 22 chapters or fargards = sections. It seems to have survived in a fragmentary state only, and is evidently the work of many hands and many centuries. It appears as if, starting from old sayings in the Avesta, the Iranian high-priests in various periods had interpreted them often at variance with each other: these their interpretations (Zend) were made the theme of further interpretations (Pâzend), and the three phases of interpretation were received in the course of time as equally authoritative among the faithful. There are three parts to be distinguished in the Vendidad. The first is introductory, containing an enumeration of 16 Aryan countries over which the Zoroastrian religion was spread; further, legends

of King Yuria, and recommendations of agriculture. The second part (chaps. 4–17) forms, as it were, the groundwork of the Vendidad, treating of laws, ceremonies, and observances. The third part is a kind of appendix, treating of various subjects, chiefly medical, such as spells against diseases, etc. Here ought to be mentioned also the Bundehesh, written entirely in Pehlvi, which seems a compilation of several extracts and fragments of partly ancient, partly recent Zoroastrian writings, forming a sort of compendium or dogmatic handbook of Zoroastrianism. For an account of Zoroastrianism, see GUEBRES: PARSEE: ZOROASTER.—Burnouf, *Vendidad-Sadé;* Olshausen, *Vendidad Zend-Avestæ* — French transl. by Anquetil-Duperron, German by Klenker; Spiegel (German text, with Spiegel's commentary, retransl. into English by Bleek); Rask, *Alter und Æchtheit der Zendsprache;* Haug, *Essays;* etc.

ZENDIK, n. *zĕn'dĭk* [Arab., an infidel, an atheist]: name given in the East not only to disbelievers in revealed religion, but also to such as are accused of magical heresy.

ZENGG, *zĕng*, or SENJ, or SEGNIA: important free port of the Austrian empire, in Croatia, on the Adriatic; 71 m. s.e. of Trieste, at the termination of the Josephine Road, opposite the island of Veglia. Z. is the see of a Rom. Cath. bp.; has a large and elegant cathedral, an upper gymnasium, a seminary for priests, an academy, and school of navigation; a small harbor (free), somewhat unsafe; and some trade in grain, honey, wax, wine, salt, tobacco, wood, fish, and cattle.—Pop. 3,500.

ZENITH, n. *zē'nĭth*, or *zĕn'ith* [F. *zénith:* Sp. *zenit*—prob corruption of Ar. *sant*, quarter, region; *sant-ur-ras*, the head region, the zenith]: the top of the heavens; the point in the heavens directly over a spectator's head, i.e., in line with the spectator's position and the centre of the earth—the *nadir* being the point directly opposite, or that under a spectator's feet; the highest or culminating point of any subject referred to. ZENITH DISTANCE, the distance of a heavenly body from the zenith. ZE'NITHAL, a. *-nĭth-ăl*, of or pertaining to the zenith.

ZENJAN, *zĕn-jân':* populous and thriving town of Persia, province of Irak-Ajemi; about 170 m. n.w. of Teheran, 70 m. s.s.w. of the Caspian Sea; on the table-land of Azerbijan, at the junction of the roads from Hamadan and Teheran to Tabriz; on a tributary of the Kizil-Ouzen, which flows into the Caspian. It is surrounded by orchards; has old walls, a palace, a mosque, bazaars, and trade in carpets, woolen cloths, arms, lead, and gunpowder.—Pop. estimated 15,000.

ZENO, *zē'nō*, NICOLO: navigator and discoverer: about 1340—about 1391; b. Venice; of patrician family. About 1375 he voyaged to the northern seas, but was wrecked. Afterward, with his brother Antonio Z., he visited Greenland and Newfoundland; and with some fishermen sailed southward along the coast, it is claimed as far as Virginia. He died in Newfoundland. Z. sent to another brother, Carlo, Vene-

tian grand-admiral, frequent reports of his discoveries, and wrote an account of them; but his papers were burned by his young grand-nephew. This youth afterward seeking to repair the loss occasioned by his rashness compiled—with the aid of a few letters that had been sent to the grand-admiral Carlo and had been preserved—a narrative (pub. Venice 1558, with map dated 1390). This whole story of Zeno, his voyages, his papers, and his very existence, was long discredited; but it has now been proved that Zeno's letters and map were known to exist 30 years before their publication (see an Eng. transl. pub. by the Hakuyt Soc., with introduction and notes, London 1873). Zeno's map of the n. coast is surprisingly correct; and his account, so far as preserved, confirms the notices by Adam of Bremen (11th century) and by Vitalis (12th century) of Scandinavian colonies in N. America more than a hundred years before the discovery by Columbus.

ZENO, *zē'nō*, OF CITIUM, *sĭsh'ĭ-ŭm:* founder of the Stoic philosophy: lived in the last part of B.C. 4th century and early part of B.C. 3d century (dates uncertain); b. at Citium, in Cyprus. He was a contemporary of Epicures. His father was a merchant, and on his trading voyages brought home with him from Athens some writings of the Socratic school. By these Zeno is said to have been attracted to the study of philosophy. At the age of 30 he was shipwrecked off the coast of Athens, and having lost his property he willingly adopted the Cynic doctrines, in which contempt for riches is conspicuously taught. He attached himself first to Crates, but soon became dissatisfied with the coarse, ostentatious disregard for established usages, and the indifference to speculative inquiry, which characterize the Cynic sect. He next joined the school of the Megaric Stilpo, and there became proficient in the art of disputation. Still unsatisfied, he betook himself to Xenocrates and after his death to Polemo the Academician. Having thus made himself master of the tenets of the various schools, he proceeded to open a school for himself, wherein he might show forth the result of all his inquiry, and develop his own peculiar system: see STOIC. He selected for the purpose the 'Painted Porch' (*Stoa Poikile*), from which his sect has got its name, and there, till his 98th year, as is said, continued to teach those doctrines which, in spite of serious drawbacks, inculcate that manly energy and simplicity, fortitude under suffering, and reverence for moral worth, which made disciples of so many of the noblest characters among the Romans. As a man, Zeno deserved and gained high respect. The Athenians honored him with a gold crown and a public burial, and his countrymen erected a monumental pillar to his honor. Of his numerous writings scarcely anything remains save the titles.

ZE'NO OF ELEA, *ē'lē-a:* philosopher of Elea, a town of

Lucania, in Italy, favorite disciple of Parmenides: b. conjecturally near the beginning of B.C. 5th century. He visited Athens, and the illustrious Pericles was one of his pupils. According to the account usually given, on his return to Elea he joined a conspiracy to deliver his native town from the tyrant Nearchus, and on the failure of his plot was captured and put to the torture. On being interrogated as to his accomplices, he named the principal courtiers, and is said to have bit his tongue off, and spat it in the tyrant's face. Historical evidence for this account is lacking; and whether Zeno perished in his attempt or survived the tyrant is uncertain. He held the usual doctrines of the Eleatic school respecting the unity and the immutability of all things, distrust in knowledge acquired through the senses, and reliance on pure reason. Phenomena or appearances he maintained were not real existences: in this he anticipated the Berkeleyan theory. His argument dealt in paradoxes which have been the standard puzzles for tyros in philosophy ever since: e.g., if the fleet Achilles be pursuing a tortoise that has the start of him, Achilles can never overtake the tortoise; for while Achilles traverses the distance from his starting-point to the starting-point of the tortoise, the tortoise advances a certain distance; and while Achilles is traversing this distance, the tortoise makes a further advance; and so on *ad infinitum:* consequently Achilles may run on forever without overtaking the tortoise. 'The flying arrow is at rest; for it is at every moment only in one place.' His paradoxes involved a comprehensive skepticism. Still his speculations had an educational influence on Greek philosophy; and he is remarkable chiefly for having been the first to employ the style of argument known by the name Dialectic, in which error is refuted, and truth established, by the *reductio ad absurdum*—a method skilfully employed afterward by Socrates and Plato. He devoted his great powers of argumentation to enforce the doctrines first broached by Xenophanes and more systematically developed by Parmenides. His works were in prose, but only small fragments have been preserved.

ZENOBIA, *zē-nō'bĭ-a,* Queen of Palmyra: reigned 267-272; succeeding her husband, Odenatus, who had been permitted by Gallienus to act as his colleague in the Roman empire, though without official Roman acknowledgment. Zenobia's rare ability as an administrator, with her brilliant physical and intellectual gifts, had greatly contributed to the strength of her husband's sway; and she had held firmly in her hands the reins of government during his long absences in war. At his death by assassination she asserted her regal claim, and nearly the whole of the eastern provinces submitted to her sway. But Aurelian, having assumed the purple, and being in command of a powerful army, marched against her, and, after defeating her in several battles, besieged her in

Palmyra. Her hopes of being relieved by the Persians and Arabians being disappointed, she attempted to escape by flight, but was captured 272. Her counselors, chief of whom was the celebrated Longinus, were beheaded; and Zenobia was led in triumphal procession at Rome, decked with splendid jewels, and almost fainting under the weight of gold chains. She was presented by her conqueror with large possessions near Tivoli, where, in the society of her two sons, Heronnianus and Timolaus, she passed the rest of her life in comfort and even splendor. She was a woman of great courage, high spirit, and strikingly beautiful. With purity of morals in private life, she combined prudence, justice, and liberality in her administration. Her literary acquirements were considerable; she spoke Latin and Greek, as well as the oriental languages, with fluency. The balance of authority is said to be in favor of the belief that she was an adherent of the Jewish faith; and she is known to have been a friend and patroness of the Monarchian bishop Paul of Samosata.

ZENTA, or SZENTA, *sĕn'tŏh:* town of Hungary, county of Bacs; on the right bank near the Theiss, 120 m. s.s.e. of Pesth, in a beautiful plain. It is notable for the victory of Prince Eugene over the Turks 1696. Cattle-breeding is carried on; and the people are entirely agricultural.—Pop. (1900) 29,580.

ZEOLITE, n. *zē'ō-līt* [Gr. *zeō,* I boil; *lithos,* a stone]: generic name for a group of minerals, consisting of hydrated silicates, so called from their frothing or intumescing into a whitish spongy enamel under the blowpipe. ZE'OLIT'IC, a. *-lĭt'ĭk,* pert. to or resembling zeolite. ZE'OLIT'IFORM, a. *-ĭ-fawrm,* like zeolite in form.—The *Zeolites* all are soluble in acids, and most of them gelatinize in acids in consequence of silica being set free. They are hydrated silicates of alkalis or alkaline earths, most of them containing alumina. Magnesia is rarely present. Their composition, however, is very various. They are generally found in amygdaloidal cavities, formed by steam, or in fissures of trap and other intrusive rocks, also in granite and gneiss, apparently as deposits from water percolating through the rock. They sometimes, but rarely, occur in veins. They are found either in crystals or of crystalline structure, often in plates or fine scales, often in needles or fibrous. Among them are *Analcime, Natrolite* or *Mesotype, Scolezite* or *Needlestone (Needle Zeolite), Stilbite, Heulandite, Brewsterite, Apophyllite, Chabasite, Harmotome* or *Crossstone,* and *Laumonite.*

ZEPHANIAH, *zĕf-a-nī'a* [Heb., 'whom Jehovah hides or protects,' or by another derivation, a 'watcher of the Lord']: one of the minor Hebrew prophets: lived during the reign of Josiah, of Judah, in the latter part of B.C. 7th century, and apparently before the 18th year of that king B.C. 621. The subject-matter of his brief

'prophecy' is the temporary desolation of Judea ('I will utterly consume all things from off the land,' i. 2), on account of the infidelity and worldliness of the inhabitants, Jerusalem being specially assailed by the author for her filth and pollution, the tyranny and rapacity of her rulers, and the violence and treachery of her priests and prophets. At the same time the prophet predicts the destruction of the surrounding heathen nations, the Philistines, the Moabites, Ammonites, Ethiopia, and Assyria. The close, in which he declares that God will leave a righteous remnant in Israel, and for their sakes will ultimately bless the land with permanent peace, is couched in a strain of tender exultation.

ZEPH'YR: a soft, cool, agreeable wind; in Greece the west, or rather west-southwest wind. The Greek name, according to etymology, signifies life-bringing, because at the time when this wind begins to blow, the plants are restored to life by the balmy spring air.

ZEPHYRAN'THES: a genus of *Liliaceæ*, indigenous to the warmer regions of America, and most commonly represented by the atamasco lily. The species are bulbous, and are not hardy in the northern states, but make charming summer-blooming window and greenhouse plants, resting in the winter. The foliage is linear, springing from the bulb, and a scape, appearing at the same time, is crowned by a regular, 3-merous corolla which is nearly, or quite, erect, from 1 to 3 in. across, and red, yellow, or white in color. *Z. candida* is one of the white-flowered species, and is also one of the hardiest and thriftiest. It is a lovely, crocus-like plant, with pure-white blossoms opening out flat in the sunshine, and evergreen foliage.

ZEPHYRUS: in Greek mythology, a son of Æolus, or of Astræus and of Aurora, a lover of Chloris or Flora. By the harpy Podarge he was the sire of the swift horses of Achilles, Xanthos, and Balios. His love being rejected by Hyacinthus, he was the cause of his death by blowing Apollo's quoit against his head. Some make him the husband of one of the Hours. Flowers and fruits are under his protection. He is represented as a gentle beautiful youth, naked, with a wreath on his head, or flowers in the fold of his mantle.

ZEPPELIN, Ferdinand, Count von: German inventor; b. Constance, Baden, 1838, July 8. He took part in the Franco-German war as an officer of cavalry; arose to the rank of lieutenant-general in the German army; and was attached to the suite of the king of Würtemberg. He became known for his experiments in connection with dirigible balloons. His first ascent was on July 6, 1892, at Bern, the balloon safely arriving at Lucerne. On July 2, 1900, he made an ascent at Manzell, near Friedrichshafen, on Lake Constance, in 'one of the most ingenious, expensive, and carefully constructed balloons

of modern times.' This balloon rose 1,300 ft., travelled 23 m. in 17 minutes in a prescribed direction, and was finally forced only by an accident to the sliding-weight and one of the rudders to descend, which it accomplished with perfect ease. On Oct. 17 Zeppelin undertook a second ascent, the balloon on this occasion remaining in the air for an hour at an average height of about 2,000 ft., making noticeable headway and remaining in perfect control against a 7-mile wind. When the German government determined to adopt the dirigible balloon as an instrument of warfare, it was part of the conditions that an airship should stay 24 hours in the air. Zeppelin fulfilled this condition, but an accident, when the ship was fastened to the earth, led to its total destruction. This was regarded as a national calamity, and a popular subscription enabled the inventor to construct another and improved vessel. In Mar. 1909, a series of experiments conducted by the engineers of the war department, demonstrated the feasibility of controlling and landing balloons of the type invented by Zeppelin. In one experiment 20 persons were carried. The fact that it was able to land on the ground without sustaining any serious damage shows that such a vessel can be used for transporting people, and landing them safely in case of accident.

ZERAFSHAN, Asiatic Russia: a river rising in a velley at the junction of the Hissar and Turkestan Mountain chains, and after a westerly by north course of about 400 m., passing the towns of Penjakent, Samarkand, Katakurgan, Kerminch, and Bokhara, dispersing itself in the desert sands between Karakul and the Oxus river. A railway line traverses the valley from Karakul to near Penjakent.

ZE'RAH: a king of Ethiopia, known to the Egyptians as Azech Amen, who flourished in southern Egypt about 900 B.C. He conquered Egypt and invaded Palestine, where Asa, king of Judah, completely defeated him, as a consequence of which Zerah abandoned not only Palestine, but also Egypt.

ZERBI, Gabriel: Italian physician and anatomist: b. Verona in the 15th century; d. there 1505. After many years of study he lectured for some time at Rome, and became professor of medicine at Padua in 1495. His chief work is *Anatomy of the Human Body,* published about 1490, which contains the germ of several discoveries in anatomy.

ZERBONI DI SPOSETTI, Joseph: German philosopher: b. Breslau 1766; d. 1831. Having written, in 1796, a letter to the governor of Silesia, showing the unreasonableness of attaching an unlimited importance to the right of birth in the nobility, he was imprisoned for three years on a charge of high treason, by order of Frederick William III. Being at last brought to trial

he was liberated, and was subsequently employed in several public offices.

ZERBST, Germany: a town in the duchy of Anhalt, on the Nuthe, 21 m. s.e. of Magdeburg. The chief buildings are the great Schloss in a fine park; the 15th century Nikolaikirche; and the stately 15th century Rathhaus on the market place where are the Roland column (1445), and the Butterjungfer, a slender column bearing a female figure. The chief educational institution is the Francisceum, a gymnasium of high repute. The town has manufactures of noted bitter beer, of silks, plush, cloth, leather, machinery, musical instruments, etc. Zerbst was founded in 1007. From 1603 to 1793 it was the capital of a principality of the same name, which in 1797 was absorbed in Anhalt-Dessau. Pop. (1900) 17,094.

ZERIBA, n. *zĕr-ē'ba*, or ZAREEBA, n. *za-rē'ba* [Egypt. *zerebak*, a thorn hedge]: a word which came into use in 1884, during military operations in Egypt, to denote an inclosure the sides of which are formed of prickly brushwood, sheltered by which a force may camp comparatively safe from sudden surprise.

ZERO, n. *zē'rō*, ZEROS, or ZEROES, n. plu. *zē'rōz* [F. *zéro*—from It. *zero*—from Arab. *sifr*, a cipher: the same word as CIPHER]: the neutral point between any ascending and descending scale or series, generally represented by the mark 0; the extreme point of depression; naught; nothing; the point of a graduated instr. at which its scale commences. In the thermometer and similar scales the zero is the line from which all the divisions are measured up or down, or in the positive and negative directions. In the Centigrade and Reaumur thermometers, Zero notes the freezing-point of water, measurements above the 0 or zero being distinguished as positive or +, while those reckoned downward from the 0 or zero are distinguished as negative or —. In the Fahrenheit scale (F.) in general use in the United States, the United Kingdom, and Brit. colonies, the zero is placed 32° below the freezing-point of water (see THERMOMETER). ABSOLUTE ZERO OF TEMPERATURE, the lowest possible temperature which the nature of heat admits of. This has been determined, and is 273.70 below the zero of the centigrade scale (see THERMOMETER).

ZERRAHN, *tsĕr-rân'*, CARL: musician: b. Malchow, Germany, 1826, July 28. He studied music in Rostock, Hanover, and Berlin; and came to the United States 1848 with the Germania Musical Soc., which gave concerts in the principal cities of the country, with such artists as Jenny Lind, Madame Sontag, Ole Bull, Thalberg, and Camilla Urso. Zerrahn has been musical director of the Handel and Hayden Soc. of Boston since 1854; conductor of the Harvard Musical Assoc. 1866-82; conductor of the festivals of the Worcester Co. Musical

Assoc. since 1865 (except 1868, when he was in Germany); and assisted in New York festivals 1869-73. He has edited *The Index* and *The Apograph* (1885), for the use of musical organizations.

ZEST, n. *zĕst* [F. *zeste,* a piece of citron or lemon skin—from L. *schistus;* Gr. *schistos,* divided—from Gr. *schizō,* I divide]: something that gives a relish; taste added; relish; hence piquancy; gusto; hearty satisfaction: V. to heighten the taste or relish of. ZEST'ING, imp. ZEST'ED, pp.

ZETA, n. *zē'ta* [L. *zeta,* for *diæta,* a chamber, a dwelling—from Gr. *diaita,* a way of living, mode of life, a dwelling]: a little closet or chamber; applied by some writers to the room over the porch of a Christian church, where the sexton or porter resided, and kept the church documents.

ZETETICS, n. *zē-tĕt'ĭks:* a part of algebra which consists in the direct search after unknown quantities.

ZETICULA, n. *zē-tĭk'ū-lă* [dim. from L. *zeta,* a drawing-room, a summer-house]: a small withdrawing-room.

ZET'LAND. See SHET'LAND.

ZEUGLODON, *zū'glō-dŏn* (literally, 'yoke-tooth'): genus of fossil cetaceans or whale-like mammals, with long snout and yoke-like, double-rooted formation of some of the molar teeth (hence the name); and regarded by Huxley as intermediate between the true cetaceans and the carnivorous seals. The genus was originally named *Basilosaurus,* on the supposition that the creature was a saurian. The remains of Zeuglodon were found first in La., 1839; an almost complete specimen, 70 ft. long, was obtained 1843 in Ala. The vertebræ, of large size, were formerly so common in some places in the Gulf states as to be used in the manner of stone fences. A long string of them, mounted, was exhibited once in St. Louis as the remains of a gigantic serpent; but the fraud was soon exposed.

ZEUGLODONTIDÆ, n. plu. *zū-glō-dŏn'tĭ-dē* [Gr. *zeuglē,* the strap or loop of the yoke, of which the yoke had two; *odous* or *odonta,* a tooth]: family of extinct cetaceans in which the molar teeth are two-fanged (see ZEUGLODON.

ZEUGMA, n. *zūg'ma* [Gr. *zeugma,* a band, a yoke—from Gr. *zeugnumi,* I yoke or link together]: a junction of words; a figure in grammar by which a verb or adjective is joined to two nouns though suitable to only one of them, but which suggests another verb or adjective suitable to the other noun. ZEUGMATIC, a. *zūg-măt'ĭk,* of or pertaining to the figure zeugma.

ZEUS, *zūs* [Skr. *div,* light; *djaus,* heaven; *devas,* god: L. *Ju-piter* and *Dies-piter,* i.e., Father Zeus: AS. *Tiu,* whence Tuesday]: greatest of the national deities of Greece. According to the most received mythology, he

was the son of Cronos and Rhea, brother of Poseidon and Hera, the latter of whom was also his wife. He expelled his father and the older dynasty of the Titans; assumed the sovereignty of the world, and successfully resisted the attacks of the giants and the conspiracies of the gods. In the allotment of the world, after the dethronement of the Titans, Zeus gained the rule of heaven and air, Hades of the infernal regions, and Poseidon of the sea; while the earth was left subject to the influence of all three, though Zeus was regarded as having the supremacy throughout all departments. Crete, Dodona, and Arcadia were the places where the worship of Zeus was most cultivated; and though originally the inhabitants of these places may not have regarded themselves as worshippers of the same god, yet, in process of time, all the local gods revered under the name of Zeus were at last merged in one great Hellenic divinity—a process carried further when he was identified with the Jupiter of the Romans and the Ammon of Libya: see JUPITER.

Besides the epithets of Zeus from the seats of his worship, he had many titles from his various powers and functions, moral and physical. He was the father and king of gods and men; the protector of kings, of law and order; the avenger of broken oaths and of other offenses; he watched over the state, the assembly, the family, over strangers and suppliants; his hand wielded the lightnings and guided the stars; he ordained the changes of the seasons, and, in short, regulated the whole course of nature. All prophecy, too, was supposed to originate in him, and from him the prophetic god Phœbus received his oracular gift. He dispensed, as it pleased him, both weal and woe to mortals; but whether he could control the Fates themselves is a point about which the ancients disagreed. Of the many epithets applied to Zeus, perhaps the best known is the Olympian, from that Olympus in Thessaly whose summit was believed to be his residence as well as that of the other gods. His most celebrated festival was the Olympic, at Olympia, in Elis, after the end of every fourth year.

Combined with such exalted conceptions of the majesty and power of Zeus, we find many stories current respecting his amours with mortals and immortals: he is represented as acting with caprice, anger, deceit. Probably, in many cases, an ancient Greek of average position and capacity did not view such matters with any very strong disapprobation. Others, again, as Xenophanes (q.v.), protested against the transference to the gods of human passions and failings; or, as Pindar, maintained that they would believe nothing of the gods that was discreditable to them; or, as Euripides, argued that such tales were sufficient to disprove their divinity; or, as Euhemerus, held that the local worship of Zeus, like that of other deities, was owing to the fact that divine honors were paid to deified men at the place of their burial,

and that of course it was no wonder to find human actions assigned to gods who had once been human. In modern times the various myths were at one time explained as symbolical of various celestial and terrestrial phenomena, such as the apparent motion of the sun, the alternation of day and night, the changes of the seasons, and so forth. The most rational explanation is as follows: In early times men thought and spoke of natural objects as if they were personal agents, employing names for them which were literally, not symbolically, significant. But from lapse of time, and the departure of various tribes from their original seats, in many countries the meaning of these words became obscured, and though men still used them, their real significance was forgotten, and terms which originally had expressed some process of nature, were conceived to narrate some incident in the history of a person: e.g., the expression that the sun follows the dawn was misunderstood, and gave rise to the myth of Phœbus pursuing the nymph Daphne, because the word Daphne was no longer understood. Such misconceptions were then, by successive ages, elaborated into myths, more or less fanciful, and even revolting. In this respect Zeus has fared no better, or rather much worse, than the other deities. In the same way as the Greek war-god Ares is a personage much inferior to the Latin Mars, so the serious and unimaginative Roman's conception of his majestic Jupiter Optimus Maximus (the best, the greatest) was more elevated than that conceived of Zeus by the sensuous Greek. But this might be expected from the different character of the two peoples. Except in the grander attributes of omnipotence and fatherly care of the universe, we can trace little in common; for the Jupiter of the Latin poets, as portrayed in Virgil and Ovid, is drawn entirely from Greek sources.

ZEUXIS, *zūks'ĭs:* Greek painter: about B.C. 420-390; b. Heraclea, probably the city of that name in Lucania. He is styled also Zeuxis Ephesus, which means that he belonged to the Ionian school of painters. He was at Athens about the beginning of the Peloponnesian war. He excelled in the treatment of light and shade, in accuracy of imitation of natural objects, and in expressing the perfection of human, particularly female, beauty. This last he effected by selecting the finest models for each separate part. His most famous pictures were: *Zeus Enthroned, with the Gods Standing Round; Helen; The Infant Hercules Strangling the Serpents; The Female Hippocentaur.* By the exercise of his art, he attained to great riches and fame, and, like his rival Parrhassius, was exceedingly conscious of his pre-eminence. He repeatedly presented rather than sold pictures to cities that were anxious to possess them, because he thought no money-price could pay for them. Greece was plundered

of many of his masterpieces by her Roman conquerors; and one of the noblest, the *Hippocentaur,* was lost on the passage to Rome. Designs on vases, sarcophagi, and other works of antiquity exist adorned with representations of the same subjects as Zeuxis painted, and probably were imitated from his productions.

ZEYST, *zīst:* large village in the Netherlands, province of Utrecht; surrounded by beautiful well-wooded estates and country-seats, the summer residences of many of the principal families of Amsterdam. The industries are making soap, candles, and vinegar, brass and zinc founding, etc. On a rising ground, and surrounded by fine old trees, stands the Dutch Reformed church, built 1180. There is also a Roman Catholic church. In 1746 a society of Moravian Brethren settled at Zeyst, where they have built a separate quarter, consisting of public and private buildings, erected along the sides of two large grassy squares, called the Easter Plain and the Wester. Besides the church, there is an excellent day and boarding school, resorted to by children of parents belonging to various Protestant communions. The unmarried members live, the males in the Brothers' Home, the females in the Sisters' House. Another building is set apart for widows. There are also family residences, workshops, and warehouses. Pop. 6,000.

ZHITOMIR′. See JITOMIR.

ZIEGA, n. *zē′ga* [etym. doubt.]: curd produced from milk by adding acetic acid, and after rennet has ceased to cause coagulation.

ZIEGLER, KARL: Austrian poet: b. Saint Martin, Upper Austria, 1812, Apr. 12; d. Vienna 1877, May 20. He studied at the University of Vienna, was in the government service from 1835 until his retirement in 1857. He published a collection of *Gedichte* in 1843. His other volumes were *Himmel und Erde* (1856); *Oden* (1866); and *Vom Kothurn der Lyrik* (1869).

ZIEGLER, THEOBALD: German philosopher: b. Göppingen, Würtemberg, 1846, Feb. 9. He studied in Tübingen, from 1871 was an instructor in various gymnasia, in 1884 was appointed lecturer on philosophy and pedagogy in the University of Strasburg, and in 1886 professor there. His *Sittliches Sein und Sittliches Werden* (2d ed. 1890; English 1892), and the *Geschichte der Ethik* (2d ed. 1892) are works of importance. His further volumes include: *Religion und Religionen* (1893); and *Fr. Th. Vischer* (1893).

ZIEGLER, WILLIAM: American capitalist: b. Beaver co., Pa., 1843, Sept. 1; d. Stamford, Conn., 1905, May 24. He at first entered the printers' trade, and in 1868 the bakers' and confectioners' supplies business. In 1870 he organized the Royal Chemical Company, which he developed into the Royal Baking Powder Company, retiring from active business in 1886. He also operated

largely in real estate. He fitted out the Ziegler expedition to explore the Arctic by way of Franz Josef Land, and, if possible, reach the North Pole. The expedition, Commander Fiala, left Vardö, Norway, 1903, July 10, and was not heard from thereafter.

ZIEGLER UND KLIPPHAUSEN, HEINRICH ANSELM: German poet: b. Radmeritz, Upper Lusatia, 1663; d. Liebertwolkwitz, near Leipsic, 1696. He was educated at Frankfort-on-the-Oder, and lived as a landed proprietor. His chief work is *Asiatische Banise, oder Blutiges doch Mutiges Pegu* (1688), which continued to appear in successive editions as late as 1764. It was reprinted, under Felix Bobertag's supervision, from the third edition (1707), in Vol. 37 of Kürschner's *Deutsche Nationallitteratur*. The work is done in a turgid style, but met in its day a great success, and had in Germany considerable literary influence. Its author's further writings are of less significance.

ZIEM, FELIX: French artist: b. Beaune (Côte d'Or) 1821, Feb. 25. He studied in the art-school of Dijon, traveled in s. France, Italy, and the Orient, obtained a third-class medal at the Salon of 1851, a first-class in 1852, and became well known for his landscapes, particularly for scenes of Venice. Among his many canvases are: *View of Venice* (1852; Luxembourg); *The Bank of the Amstel* (Bordeaux Museum); *Quai Saint-Jean at Marseilles* (Marseilles Museum); *The Doge's Palace* (Ravené Gallery, Berlin); and several in private collections in the United States.

ZIERIKSEE, Netherlands: a town in the province of Zeeland, and the chief town of the island of Schouwen, 3 m. from the Ooster Schelde, with which it is connected by two canal harbors, and 21 m. e.n.e. of Flushing. It has six churches, a fine town-house, and a gymnasium, manufactures madder, carries on brewing and oyster fishing, and has considerable trade and shipping. It is the oldest town of Zeeland, and was formerly an important Hanse town. Its demolished walls are now replaced by promenades. Pop. 7,000.

ZIETHEN, or ZIETEN, HANS JOACHIM VON: German soldier: b. Wustrau, near Neu-Ruppin, Brandenburg, 1699, May 14; d. Berlin 1786, Jan. 27. He entered the Prussian army in 1714, distinguished himself as a colonel in the Silesian campaign of 1742 and as a major-general in that of 1745, and in 1745, May, made his celebrated march through the enemy's country in Upper Silesia, in order to communicate with the Margrave Karl at Jägerndorf. In 1756 he was made lieutenant-general. He obtained his chief renown in the Seven Years' war, winning the victories of Reichenberg, Prague, and Leuthen, and deciding the day at Torgau by storming the heights of Süptitz. He was promoted general of cavalry, and

was the most famous of the commanders of Frederick the Great. In the development of the light cavalry service he made important contributions.

ZIF, or ZIPH, n. *zĭf*, or ZIV, n. *zĭv* [Heb. *zīv*—from *zachach*, to shine, to be beautiful—referring to the splendid appearance of the flowers during the month: or from Assyrian *Giv*, the Bull, the constellation Taurus]: the second month of the Hebrew year, beginning with the new moon of May; or according to some Rabbis the new moon of April. In some copies of the A. V. the spelling is Zif, in others Ziph; in the revised version Ziv, which is the correct form. Now known as *Iyar*.

ZIGANKA, n. *zĭg-ăng'ka* [Russ.]: a dance popular among the Russian peasantry; a country-dance.

ZIGZAG, a. *zĭg'zăg* [an attempt to represent the thing signified by the voice: Ger. *zickzack*: F. *zigzag*: Sw. *sicksack*]: having short sharp turns or angles: N. a sharp angular turn; something that has short turns or angles, as a line, the stem of a plant, etc.; in *mil.*, a trench of approach against a fortress, so constructed that the line of trench may not be enfiladed by the defenders (see SIEGE): in *arch.*, a Chevron (q.v.): V. to form into short turns or angles; to run or advance in sharp turns or angles. ZIG'ZAGGING, imp. ZIG-ZAGGED, pp. *-zăgd*.

ZILLAH, n. *zĭl'lă* [Ar.]: in *India*, a province or tract of country constituting the jurisdiction of a commissioner or circuit judge and the extent of a chief collectorate.

ZILLEH. See ZELA.

ZILLER, *tsĭl'lĕr*, TUISKEN: German educator: b. Wasungen, Saxe-Meiningen, 1817, Dec. 22; d. Leipsic 1882, Apr. 20. He was educated at Leipsic, where he was at first a lecturer in jurisprudence, but in 1864 became professor of philosophy and pedagogy. At his initiative the Verein für Wissenschaftliche Pädagogik was founded. Among his books are *Einleitung in die Allgemeine Pädagogik* (1856; 2d ed. 1901) and *Allgemeine Philosophische Ethik* (1880; 2d e. 1886).

ZILLERTHAL, *tsĭl'lĕr-tâl*: one of the principal valleys in the Tyrol, traversed by the Ziller; about 50 m. long. Toward the s. and s.w. it is bounded by lofty glaciers; but toward the n., where it opens into the valley of the Inn, it is fertile. Among the eight secondary valleys are the Duxerth—alfamous for its precipitous glaciers, 1,200 ft. high—and the Zemthal, both remarkable for several great waterfalls. The inhabitants of the Zillerthal, who number about 15,000, are celebrated even in the Tyrol for their handsome, well built figures; and their fine Alpine songs are well known and appreciated in London and Paris. The chief wealth of the Zillerthal is from rearing cattle. About 5,000 head of cattle are exported yearly; but, notwithstanding, the valley is not

able to support its numerous population. Many of the men hire themselves out as servants for the summer, while others go about as peddlers, selling essences of herbs, and gloves, of which 10,000 pairs are made yearly. The principal towns are Zell and Mairhofen. For some years the valley has been much visited by artists, chiefly from Munich.

In recent times, the inhabitants of Zitterthal acquired notoriety by a part of them leaving the Roman Catholic Church, and emigrating. For a considerable time they had been in the habit of reading the Bible, and were on friendly terms with the Protestant Church, though still attending the Roman Catholic service; but when, 1826, the Roman Catholic clergy began to enforce auricular confession with greater strictness, a number of them thought seriously of going over to the Protestant Church. Ere long they not only objected to the confessional, but to the worship of the saints, absolutions, masses for the soul, purgatory, etc. In 1830 they began to leave the church; and by 1832 the number of dissenters had amounted to 240. Emperor Francis, to whom, on his visit to Innsbrück 1832, they addressed a petition regarding their religion, promised them toleration; but after considerable delay they were told (1834) that they must either return to the Roman Catholic faith or remove to Transylvania, where there were Protestant congregations. As the Zillerthalers could not agree to this, they formed the resolution, as the Protestants of Salzburg had once done, of seeking a refuge in Prussia. This was granted; and the Zillerthalers, who had been allowed by the Austrian government to sell their property, set out, 1837, Aug., for Prussia. In all, 399 men, women, and children arrived, Oct. 2, at Schmiedeberg, in Silesia, where they were to stay until arrangements for their reception in Erdmannsdorf were completed. The king gave them 22,500 thalers (£3,375) on their settlement, and (1839) made them a further grant of 12,500 thalers (£1,875) for a church and school. The colony received the name of Zillerthl, and in 1871 numbered over 400 inhabitants.

ZIMBABWE, or Zimbabye (Bantu for 'there is a great kraal'): a name applied to numerous interesting South African ruins in Rhodesia and the Transvaal. The best known and most important is the Great Zimbabwe, near the Sabi river, about 17 m. from Victoria in s. Rhodesia. There are two principal structures at Great Zimbabwe, one on the crest of a granite hill breaking down precipitously to the south, and the other on the level ground about a third of a mile to the south. The lower one is roughly circular or elliptical, enclosed by a wall of 30 or 40 ft. high, 14 ft. thick at the base, and from 6 to 9 ft. thick at the summit. The wall is composed of well-trimmed blocks of granite fitted together without mortar in regular courses, and occasionally set

angularly for ornamental purposes. An inner wall runs close to the outer for a considerable distance, forming a passage which leads to a sacred enclosure containing two conical solid towers, the larger of which is some 40 ft. high. The rest of the enclosure is divided into irregular chambers, none of which are roofed. The building on the hill is very strongly built for defense, and also contains a sacred enclosure. Phallic emblems, many curious objects in soapstone, and undoubted remains of gold-working utensils have been found in the Zimbabwes. The nearest gold deposits and ancient gold workings are, however, some miles distant. Some theorists would locate here the Ophir of Solomon. It is generally believed that the lower building was a kind of town occupied by pre-Mohammedan Arabs who came here in search of gold, and that the ruin on the hill was a stronghold for defense. The buildings show distinct signs of orientation.

ZIMENT-WA'TER, n. *zĭm'ĕnt-* [Ger. *cementwasser*, cement or cementation water]: water formed in copper mines; water impregnated with copper.

ZIMMERMAN, Eugene: American caricaturist and illustrator: b. Basel, Switzerland, 1862, May 22. After a public school education in Paterson, N. J., and some time in various employments, he turned his attention to comic art, was on the staff of *Puck* illustrators in 1882-5, and in 1885 became connected with *Judge*. He also executed illustrations for some of the works of 'Bill' Nye and others.

ZIMMERMAN, Jeremiah, D.D., LL.D.: American clergyman and numismatist: b. Snydersburg, Md., 1848, Apr. 26. Graduated from Pennsylvania College, Gettysburg, in 1873, and the theological seminary there in 1876, he was pastor of the Lutheran Church at Valatie, N. Y., in 1877-8, and in 1879 organized at Syracuse, N. Y., the First English Lutheran Church, of which he is still the pastor. He also became a lecturer in Syracuse University. He is regarded as an authority on the historical branch of numismatics. Among his writings is the volume *Spain and her People* (1902).

ZIMMERMANN, Albert: German painter: b. Zittau, Saxony, 1808, Sept. 20; d. Munich 1888, Oct. 18. He studied in Dresden and Munich, and was made professor in the Milan Academy in 1857 and at the Vienna Academy in 1860. His works display admirable characterizations of mountainous scenery and excellent light-effects. Among them are: *Rocky Landscape with Centaurs and Leopards; Chiem Lake in Storm; The High Göll; Sunset on Hintersee;* and *Lake Como.*

ZIMMERMANN, Johann Georg, Chevalier von: Swiss philosopher and writer: b. at Brugg, canton of Aargau (then in Bern), 1728, Dec. 8; d. Hanover 1795, Oct. 7. He studied medicine under Haller at Göttingen,

and in 1754 was appointed public physician to his native town. He employed his leisure in the publication of pieces in prose and verse, including the first sketch of his popular work *Ueber die Einsamkeit* (On Solitude, 1756; completely re-writen 1784-5). This was followed by his essay *Vom Nationalstolz* (On National Pride, 1758). In 1763 he composed his work *Von der Erfahrung in der Arzneikunst* (1764), which he followed up by several other professional treatises; in consequence of which he received an offer of the post of physician to the king of England for Hanover, which he accepted, and removed in 1768 to that capital. In 1786 he attended Frederick the Great in his last illness, which afforded little room for medical skill, but enabled him to publish an account of his conversations with that celebrated sovereign, *Ueber Friedrich den Grossen und meine Unterredung mit ihm* (1788), and *Fragmente über Friedrich den Grossen* (1789), works of no value. His *Solitude* was at one time very popular, and was translated into almost every language of Europe.

ZIMMERMANN, Wilhelm: German poet and historian: b. Stuttgart 1807, Jan. 2; d. Mergentheim, Würtemberg, 1878, Sept. 22. After study at Tübingen, he was connected with various journals at Stuttgart, from 1847 to 1850 was professor of history and of German language and literature in the Polytechnic Institute there, but lost the post through his liberal attitude as a member of the German National Assembly (1848) and the Würtemberg parliament. Subsequently he was pastor of Evangelical churches at Leonbronn, Schnaitheim, and Owen. He is best known for his *Gedichte* (1831; 2d ed. 1839; 3d 1854), which reveal the influence of Schiller and Uhland, but are never merely imitative. Others of his publications are: *Befreiungskämfke der Deutschen gegen Napoleon* (1836; 3d ed. 1859); *Geschichte des Grossen Bauernkriegs* (1841; 2d ed. 1856), and *Geschichte der Deutschen Nationallitteratur* (1846).

ZIM'MERN, Helen: English authoress: b. Hamburg, Germany, 1846, Mar. 25. After a secondary education at Bayswater, she became a contributor to *Once a Week*, *Old Merry's Monthly*, the *Press*, the *Examiner*, and other periodicals and journals, and in 1876 achieved a success with *Schopenhauer, his Life and Philosophy*. From 1887 she has resided at Florence, Italy, where she corresponds for Italian, English, and American periodicals. She has also lectured in Italy, England, and Germany, on Italian art. Among her further publications are: *Gotthold Ephraim Lessing, his Life and his Works* (1878); *The Epic of Kings* (1882), a paraphrase from Firdusi; a *Life of Maria Edgeworth* (1883); and *The Hansa Towns* (1889). She also translated from Nietzsche, and Lessing's prose, and edited the comedies of Goldoni (1892).

ZINC, n. *zĭngk* [F. *zinc;* Ger., Sw., and Dan. *zink*, zinc —perhaps from Ger. *zinn*, tin]: an elementary body, forming a light metal of a bluish white color, harder than lead, and much used as a substitute for it in the arts, in architecture, etc., in the form of plates, rolled sheets, and leaves; alloyed with copper it forms *brass;* spelter: V. to coat or cover with zinc. ZINC'KING, imp. *-kĭng:* N. process by which iron is coated with zinc. ZINCKED, pp. *zĭngkt:* ADJ. coated with zinc. ZINC-WORKER, one who manufactures articles out of sheet and plate zinc, such as rain-pipes, water-runs, and roof-ridges. ZINCODE, n. *zĭng'kōd* [Gr. *hodos*, a way]: the positive pole of a galvanic battery. ZIN'COID, a. *-koyd* [Gr. *eidos*, appearance]: like zinc; applied to the zincous plate in connection with a copper-plate in a voltaic circle, to note the positive pole. ZIN'COUS a. *-kŭs*, of or pertaining to zinc; pertaining to the positive pole of a galvanic battery. ZINC'KY, a. *-kĭ*, pertaining to or resembling zinc. ZINCIFEROUS, a. *zĭngk-ĭf'ĕr-ŭs* [L. *fero*, I bear]: containing or yielding zinc. ZINCITE, n. *zĭngk'īt*, a native oxide of zinc, found at Franklin Furnace, Sussex co., New Jersey; red oxide of zinc or spartalite. ZINCOGRAPHY, n. *zĭng-kŏg'ra-fĭ* [*zinc*, and Gr. *graphō*, I write]: the art of drawing upon and printing from plates of zinc. ZINCOG'RAPHER, n. *-fĕr*, an engraver on zinc-plates. ZINCOUS ELEMENT, the basic or positive element of a binary compound. ZINC-WHITE, oxide of zinc, used as a pigment in the place of white-lead. ZINC-VITRIOL, sulphate of zinc.

ZINC (symb. Zn, at. wt. 65; sp. gr. 6·8 to 7·8): a hard bluish-white metal, lustrous externally, which, when broken, exhibits a foliaceous crystalline fracture. At ordinary temperatures it is somewhat brittle; but when heated to 248° to 302° F. it becomes perfectly ductile and malleable, and may be drawn into wire or rolled, without danger of fracture, into thin plates, retaining its malleability when cold. At about 410° F. it again becomes so brittle that it may be easily pulverized. It fuses at 773°, and at a white heat may be volatilized; and if the vapor be exposed to the air, it burns very brilliantly, and is converted into oxide of zinc, which is deposited in copious white flakes. The temperature of its boiling-point is estimated by Deville at 1,904° F. On exposure to the air, Z. soon loses its metallic lustre, and assumes a gray appearance, in consequence of its surface becoming oxidized, while the metal beneath is thus protected from further change—a property which renders this metal especially useful for many economical purposes, as in roofing, and as a coating of sheet iron for roofing and other purposes, and for coating telegraph and other wires: see GALVANIZED IRON. It has no action on water at ordinary temperatures, but if a mineral acid be present, it readily decomposes water, and is employed to decompose the water of dilute sulphuric acid, when hydrogen is required. Moreover, a hot solution of potash acts on Z., hydrogen being liberated, while oxide of Z. is formed and dissolved in the alkaline solution. Z. precipitates from their solutions most of the

electro-positive or basylous metals less oxidizable than itself.

This metal is never found in the native state. In its commercial state it is commonly called Spelter (q.v.). That obtained by the ordinary methods of extraction usually contains a small quantity of lead, iron, and carbon, with occasional traces of arsenic and copper. To obtain it in a chemically pure state, a stream of sulphuretted hydrogen is passed through a slightly acidulated solution of sulphate of zinc, and after removal of any precipitate that may be found, the solution is boiled to expel the gas, after which the Z. is precipitated in the form of carbonate, by the addition of carbonate of soda. The carbonate is converted by ignition into oxide of Z., which must be distilled in a porcelain retort with the purest available form of carbon, e.g., charcoal prepared from loaf-sugar.

Z. is commonly regarded as forming only one compound with oxygen—namely, *protoxide of zinc* (ZnO), though it has been suggested that the film formed on the surface of metallic Z. by exposure is a sub-oxide. Protoxide of Z. is obtained by heating the metal in the air. The white oxide thus obtained was known formerly as *Lana philosophica*, from its woolly appearance, and in pharmacy as *Flores zinci*, or *Flowers of Zinc*. The process of manufacturing this oxide, when it is required as a pigment, consists in distilling Z. from clay retorts into chambers through which a current of air is maintained. The volatilized metal burns at the high temperature to which it is exposed under these circumstances; and the oxide is deposited in a series of condensing chambers. The pigment thus obtained is known as *Zinc White*. The impure oxide of Z., commonly know as *Tutty*, is obtained from the flues of furnaces in which brass is melted. A hydrated oxide of Z. (ZnOH) is precipitated in a white gelatinous mass from the solution of the salts of Z. by addition of potash or soda, but redissolves in an excess of the alkali. Oxide of Z. is readily soluble in acids, and is capable of being reduced by charcoal, but not by hydrogen. The most important salts formed by oxide of Z. are the sulphate and carbonate. *Sulphate of Zinc*, or *White Vitriol* ($ZnSO_4,7H_2O$), occurs in large transparent, glistening, four-sided prismatic crystals, resembling those of Epsom salts. At a temperature a little below 212° F. the crystals lose six atoms of their water of crystallization, and at a very much greater heat (about 500° F.) they lose the 7th atom, and previously to losing their water of crystallization, they fuse in it. This salt is readily soluble in water, requiring $2\frac{1}{2}$ parts of the latter for its solution at 60°. It is obtained in considerable quantity as a residue in the process of obtaining hydrogen from dilute sulphuric acid and Z.; and it is prepared on the large scale by roasting and lixiviating zinc-blende or sulphide of Z., which, when heated in the presence of air, is oxidized into the sulphate. *Carbonate of Zinc* ($ZnCO_3$), or zinc-spar, constitutes one of the most important of the zinc ores. Normal carbonate of Z. has never been artificially prepared, but a basic carbonate, having the composition

expressed by the formula $2(ZnO,CO_2)$, $3(ZnO,HO)$, may be prepared by precipitating a salt of oxide of Z. with carbonate of soda, when the required salt falls as a white precipitate. Of the haloid salts, the *Chloride of Zinc* ($ZnCl_2$), known formerly as *Butter of Zinc*, is the only one requiring notice. This salt is obtained in the anhydrous form by burning Z. in chlorine gas, and in the hydrated state by dissolving Z. in hydrochloric acid, and evaporating the solution, chloride of Z. being thus formed, while hydrogen escapes in the gaseous form. In the anhydrous state, it forms a whitish-gray, semi-transparent mass, which fuses readily, and sublimes at a high temperature. When exposed to the air, it soon deliquesces and is soluble in water in all proportions. The watery solution has a burning and nauseous taste, and in a concentrated state acts as a powerful caustic. It may be crystallized with 1 equivalent of water from its aqueous solution; and it is soluble in alcohol. It forms double salts with the chlorides of sodium, potassium, and ammonium; and a concentrated solution of the double chloride of Z. and ammonium ($H_4NCl + ZnCl_2$) is much used for removing the film of oxide from the surface of metals, such as zinc, iron, or copper, which are to be united by the operation of soldering. With sulphur, Z. forms only one combination—viz., *sulphide of zinc*, or *blende* (ZnS), one of the most abundant of the Z. minerals. Blende, when pure, is of pale brown color, but it is commonly blackish from admixture with sulphide of iron. It occurs usually crystallized in rhombic dodecahedra, or allied forms, but sometimes is found in the massive state. Sulphide of Z may be obtained artificially as a white precipitate, which, on drying, becomes yellow, by addition of sulphide of ammonium to a solution of a zinc-salt. Z. forms several important alloys, among which *brass* (consisting of 2 parts of copper to 1 of zinc), *Muntz's metal* (consisting of 3 parts of copper and 2 of zinc [see YELLOW METAL]), and *German Silver* (q v.) are specially notable. Prof. Miller sums up the characters of the salts of Z. as follows: 'The salts of zinc are colorless; their solutions have an astringent, metallic taste, and act rapidly as emetics. They are distinguished by giving no precipitate in acid solutions with *sulphuretted hydrogen*, but they yield a white hydrated sulphide of zinc with sulphide of ammonium.'

Manufacture.—That the Romans were acquainted with the art of making brass—an alloy of copper and Z.—is proved by the analysis of some of their coins struck soon after the Christian era. Yet Z. itself was not known in Europe as a distinct metal until Paracelsus in the 16th c. described its distinctive properties. Probably the Roman brass was produced by smelting ores containing both Z. and copper, some of which are at the present day smelted in Sweden. Z., however, was brought from the East by the Portuguese long before it became an article of commerce in Europe, and is supposed to have been known and made into articles of use and ornament both in India and in China from an early period.

ZINC.

There are several ores of Z., but only two of much importance—blende and calamine. Zinc sulphate, or white vitriol, is sometimes found, in rhombic prisms, and results from the decomposition of zinc-blende; and the other Z. compounds are numerous. Blende, black-jack, or sulphuret of Z., contains, when pure, about 67 per cent. of Z., but, like most ores, it is rarely found pure. The usual composition of English blende is Z. 61, iron 4, and sulphur 33. It occurs in all the older geological formations, and is often associated with the ores of copper and tin, but most frequently with lead ore—occurring, of course, like these, in veins. Blende crystallizes in the form of the rhomboidal dodecahedron. The crystals have considerable brilliancy, but their lustre is waxy rather than metallic. It is usually of dark color, from the sulphuret of iron which it contains—hence the miners' name of *black jack*. Sometimes it is sufficiently argentiferous for profitable extraction of the silver. Blende is found in Wales, Isle of Man, Cornwall, and Derbyshire. It is also found in a good many localities on the European continent—Sweden, in particular, being rich in this ore.

The name calamine has hitherto been used indiscriminately for both the anhydrous carbonate of Z. ($ZnCO_3$), properly called Smithsonite, and the hydrous silicate of Z. ($ZnSiO_3$), which resemble each other in physical properties. It is now usual to restrict the name to the silicate. Calamine varies much in the proportion of metal which it contains, on account of impurities. Its primitive crystalline form is the rhombohedron, but calamine as well as blende occurs more frequently massive than in crystals. It is usually of either dull-yellow or reddish-brown color. Like some other useful substances, calamine was formerly exported from England as ballast, through ignorance of its value. Belgium, Silesia, and Carinthia are well-known European continental localities; recently extensive deposits were discovered on the n. coast of Spain, which are estimated to last for ages; and the island of Sardinia is an important source. It occurs abundantly in the lead regions in the neighborhood of the upper Mississippi and the lower Missouri rivers, where it was formerly thrown aside as 'rotten stone.' The chief deposits worked are in Tenn., Ark., and (with blende) in the s.w. parts of Mo. and Wis., and also in Lehigh co., Penn., all, or mostly, in Silurian rocks.

Red oxide of Z. is found in N. J., where it is smelted. This is the protoxide (ZnO) with a small quantity of oxide of manganese, which gives it its red color. Willemite, or electric calamine, is another ore, generally associated, when found, with calamine. It is smelted in the United States, and yields very pure zinc. Franklinite, named from its locality in N. J., is a compound of Z., iron, and manganese oxides. The mining in the United States is chiefly by the Lehigh Zinc Co., the N. J. Co. at Franklin, N. J., the Passaic Co., with mines at Ogdensburg, N. J., and the n.w. companies; and the smelting works best known are near Jersey City and at Bergen Point, N. J.; and, in the w., at La Salle, Ill., at Cherokee, Kan., and St. Louis.

Mo. A white variety of zinc-blende occurs at Franklin, N. J. Hydrozincite, or zinc-bloom, usually earthy, sometimes stalactitic, is found in most mines of Z.; a cupreous variet· in Lancaster, Penn. Zinkenite is a lead and antimony sulphide. Smithsonite ($ZnCO_3$) and calamine can be distinguished by the fromer effervescing with acids.

According to reports of the census of 1890, the total of zinc ores mined the year preceding in the states e. of the Rocky Mts. was 234,503 short tons, valued at $3,049,799. By states the tons mined were: Mo. 93,131; Penn. and N. J. 63,339; Kan. 39,575; Wis. 24,832; Tenn. and Va. 12,906; Io. 450; N. Mex. 140; Ark. 130. The production of metal and of oxide are united, except in Wis., whe the latter only is carried on; and the N. J. works are mostly confined to this. Of the oxide, 21 establishments produced 16,970 short tons and 58,860 of spelter (metal).

The production of zinc in the world, 1905, in metric tons, was as follows: Germany 198,208; United States 182,014; Belgium 143,165; United Kinkdom 50,125; France, 44,075; Holland 13,550; Austria 9,210; Russia 7,520; Spain 5,500; total 654,367 metric tons.

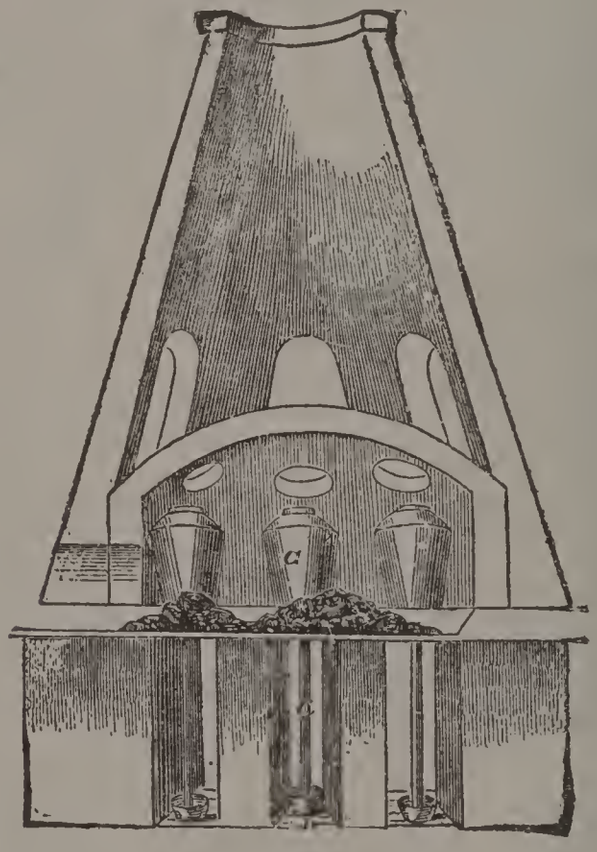


Fig. 1.

There are several distinct processes for extraction of Z. from its ores; and of these the English, the Belgian, and the Silesian are most important. The English process is as follows: The Z. ore (blende or calamine) is crushed between rollers to the size of hazel-nuts, and then roasted for about 12 hours, with occasional stirring, in a calcining

furnace. The furnace in which the roasted ore is reduced resembles a glass-furnace. It is either circular or octagonal in form, and usually contains six pots or crucibles of fire-clay, about 3 ft. high by $2\frac{1}{4}$ ft. in widest diameter. In the bottom of each pot is an opening, from which a sheet-iron tube, in two pieces, descends about 8 ft., and under its open end there is a sheet-iron vessel to receive the condensed zinc. Fig. 1 gives a sectional view of this furnace, and fig. 2 a view of one of the pots with its appendages on a larger scale. Z., being volatile at high temperatures, is smelted by distillation, and in the English process it is called distillation *per descensum*. An entire charge—that is, a charge for the whole six pots (*a*)—consists of one ton of calcined ore mixed with a proper quantity of ground coke. When the pots are charged, their covers are fixed and luted on, the conical portion of the descending pipe (*b*) being previously securely fixed and lined with fire-clay. The hole in the bottom of the pot is plugged with wood, which becomes converted into charcoal by the heat, and is then sufficiently porous to allow the zinc vapor to pass down, while it stops the descent of the coke or ore. The heat of the furnace is gradually raised, and soon produces vapor of Z. in the pots, which condenses as it descends the pipes (*c*), and drops into trays (*d*) placed at the bottom of each pipe. Sometimes a tube becomes stopped by a lump of Z., and when this happens, the furnace-man melts it with a bar of red-hot iron. It takes nearly three days to work off the above charge, which yields about 8 cwts. of Z., and requires about 25 tons of coal for its distillation. It is necessary to watch the pots with great care while the process is going on, as any leakage usually causes much loss of Z. The *rough zinc*, as it is called, is removed from the pans, where it accumulates in lumps, and melted in cast-iron pots. It is then well stirred and skimmed, and finally cast into ingots or cakes of the ordinary commercial size the skimmings being worked over again with a new charge of ore.

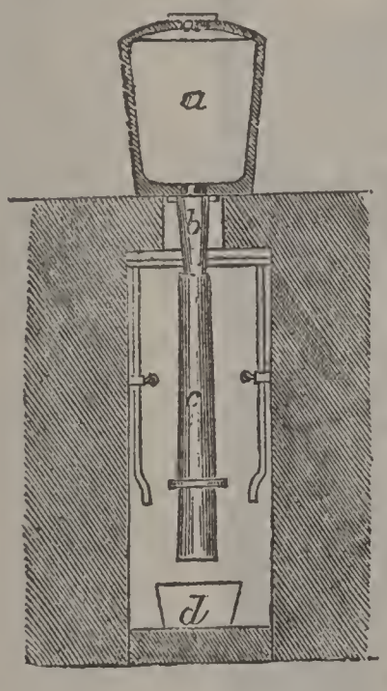


Fig. 2.

The Belgian furnace differs greatly in its construction from the English. It consists of 60 to 80 small fire-clay retorts, *a*, *a*, *a*, each about 3 ft. 6 in. long, by 8 in. in diameter, and set in a series of rectangular compartments, filling up an arched chamber. Fig. 3 shows a transverse section of this furnace. There is a clay nozzle or condenser, *b*, *b*, *b*, attached to the front of each retort, and on the end of this nozzle is a sheet-iron receiver, *c*, *c*, *c*, for the condensed Z. The fireplace is shown at *d*, and *e* is the pit to collect

the residue from the retorts. The retorts are charged with ground and roasted calamine mixed with small-coal free from sulphur. As the upper retorts receive less heat than the lower ones, they are not so heavily charged, and they are supplied with less pure ores. At the end of every six hours the receivers are emptied of their melted zinc. In this process a ton of ore can be smelted in 24 hours, and the yield from it is about 40 per cent. of metallic zinc.

In the Silesian furnace, fire-clay retorts, about 4 ft. long by 1 ft. 6 in. in diameter are arranged in two-rows, back to back, and placed horizontally on a flat furnace-bed, with a fireplace on a lower level along between the backs of the retorts. A condensing apparatus comes away with a curve from the upper part of the front of each retort, and descends about 2 ft. below it. From this the Z., on condensing, drops on the ground, or into a tray placed to receive it

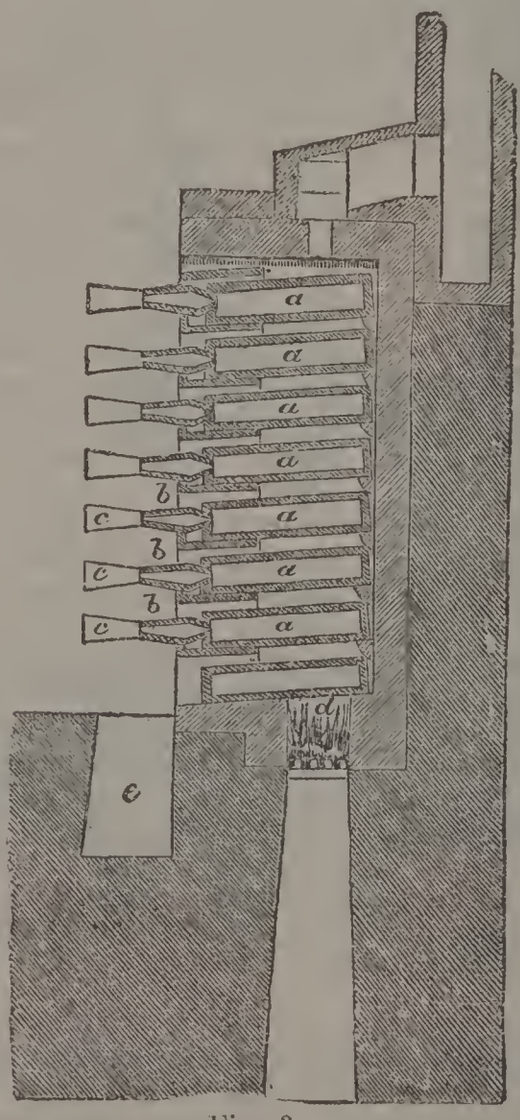


Fig. 3.

As to the comparative merits of these three processes of smelting Z., no very decided opinion appears to be yet arrived at by those who have the best means of judging. The Belgian process consumes the least fuel, but requires the greatest labor; the English is worked with the

least labor, but requires the most fuel; while the Silesian holds a sort of middle position. Each, however, has minor advantages and disadvantages which the others have not, and all three are in use.

Z. at ordinary temperatures is a comparatively brittle metal; but about the beginning of the 19th c. it was discovered that, if heated to between 200° and 300° F., its malleability and ductility were so increased that it could be rolled with facility into thin sheets, or drawn into fine wire. Since this was known, the uses of the metal, which formerly was employed only with copper to make brass, have become greatly extended. In sheets it is used for roofing, baths, water-tanks, spouting, and the like: also for covering ships' bottoms instead of copper. A considerable quantity is consumed for name-plates, for engraving upon, and for galvanic batteries. Perforated sheets with various ornamental patterns are manufactured for screens, blinds, light fences, and similar objects. As a material for casting artistic works, Z. has the desirable properties of having a low melting-point, and of taking a sharp impression from the mold, so as to require but little labor from the chaser: it also has considerable hardness. It has, in consequence, become a favorite material for making casts of statues, statuettes, and different kinds of ornaments.

The total amount of spelter produced in the United States in 1904 was 181,803 short tons, valued at $18,543,906; in 1905 the production was 201,748 short tons, valued at $23,733,635, the largest output in its history. Illinois, Indiana, Kansas, and Missouri were the chief producing states.

Medical Uses.— In its purely metallic state, Z. produces no effect on the animal economy, but several of its compounds are very active medicines. As a matter of convenience, we consider these compounds alphabetically. *Acetate of Zinc*, is a salt obtained by dissolving, with the aid of heat, carbonate of Z. in a mixture of acetic acid and distilled water, filtering the liquid while hot, and setting it aside to crystalize. In this process, the carbonic acid of the carbonate of Z. is displaced by the acetic acid and escapes with effervescence. The salt is obtained in thin, translucent, and colorless crystalline plates of pearly lustre, with sharp unpleasant taste, soluble in water, from which it may be precipitated, pure white, by sulphuretted hydrogen, and evolves acetic acid when decomposed by sulphuric acid. The crystals contain 3 equivalents of water, and their composition is represented by the formula $ZnO,C_4H_3O_3,3H_2O$. Acetate of Z. is not much employed internally, but is one of the most valuable local astringents, and is useful (in the form of solution of 3 to 5 grains in an ounce of water) especially in the treatment of skin diseases attended with much discharge, such as eczema, impetigo, etc., when the first inflammatory symptoms have subsided; and it is a useful astringent in the milder form of opthalmia. It was the active ingredient in Sir Astley Cooper's celebrated injection for gonorrhea

in the third week—six grains of sulphate of Z. mixed with four fluid ounces of dilute solution of subacetate of lead, when sulphate of lead is precipitated, and acetate of Z. is held in solution. When employed as an ointment in skin diseases, 4 to 10 grains finely powdered may be rubbed up with cold-cream or simple ointment. *Carbonate of Zinc* is obtained for pharmaceutical purposes by decomposition of sulphate of Z. in solution and carbonate of soda, when the carbonate of Z. is precipitated as a white, tasteless, inodorous powder, insoluble in water, but soluble with effervescence and without residue in dilute sulphuric acid. This preparation has been introduced as a substitute for *native calamine*, which formerly had high reputation, but was so frequently adulterated as to render an officinal salt of known composition very desirable. Either in powder or in the form of ointment, it forms an excellent astringent application for treatment of intertrigo (or chafing of the skin), excoriations, and chronic skin diseases attended with much discharge. *Turner's Cerate*, though not in the Pharmacopœia, is in general use as a drying and healing ointment, and is one of the most popular remedies for superficial burns and sores. It is made by taking prepared calamine (or carbonate of Z.) and wax, 7½ ounces of each, and olive-oil, 1 pint. Melt the wax, and mix the oil with it, then remove them from the fire, and when the mixture begins to thicken, add the calamine, and stir constantly till they cool. *Chloride of Zinc*, in the form of colorless opaque rods, obtained by pouring the concentrated solution into proper molds, is used in surgery as a powerful caustic in cases of cancer, fungous growths, etc In toothache caused by caries, a minute portion of chloride of zinc introduced into the cavity of the tooth after the removal of the diseased parts, affords almost immediate relief. In consequence of its powerfully destructive properties, it should never be applied except by the surgeon. The solution of this salt, commonly known as *Burnett's Disinfectant Fluid*, is of much use in the sick-room or hospital ward as a deodorizing agent; as, however, it possesses strong caustic properties, great care must be taken that it is not administered internally in mistake for some other medicine. Few years pass without several fatal cases of this kind being recorded. *Oxide of Zinc* is characterized in the Pharmacopœia as 'a soft, white, tasteless, and inodorous powder, becoming pale yellow when heated, and forming with diluted sulphuric acid a solution which gives a white precipitate with hydrosulphide of ammonia.' It is employed internally with much success as a tonic in chorea and epilepsy, in which it must be given for a considerable period, and in gradually increasing doses till a scruple is taken daily. In doses of one or two grains combined with extract of henbane, it forms an admirable night-pill to check the perspiration in pulmonary consumption. Employed externally, in the form either of powder or of ointment, it is a good astringent in cases of excoriation, sore nipples, intertrigo, slight ulcerations, etc. The officinal ointment, containing 80 grains to an ounce of

simple ointment, is too strong for ordinary cases, and is apt to *cake* on the surface: these defects may, however, be removed by addition of glycerine. *Sulphate of Zinc* is employed as an astringent, a caustic, an emetic, and a tonic. As an astringent, it is given internally in small doses (half a grain to two grains, made into a pill with conserve of roses) in cases of chronic diarrhea, chronic bronchitis, and long-standing leucorrhea; while it is used topically as a lotion in old ulcers (5 to 20 grains to an ounce of water), as a collyrium in chronic ophthalmia, and as an injection in the abortive treatment of gonorrhea (i.e., when it is wished to cut short the disease before inflammatory symptoms appear). As a caustic, this salt, in its anhydrous state, and finely levigated, was strongly recommended by Sir James Simpson, who applied it in the form of powder; of a paste made with glycerine in the proportion of a dram of the latter to an ounce of the powder; or of an ointment consisting of two drams of prepared lard, rubbed up with an ounce of the powder. It has also been successfully used in the Dublin hospitals. Sulphate of Z. may be given in the same doses as the oxide as a tonic in cases of nervous palsy, and in the exhaustion resulting from sexual excesses. In large doses, as 15 to 30 grains, it operates as a safe and speedy emetic, and is preferable to all other emetics in cases of poisoning.

ZINCOGRAPHY, *zĭng-kŏg′ra-fi:* the art of printing from zinc-plates on which a design in writing has been etched in relief by the action of a dilute acid. The process is as follows: A plate of zinc finely polished is prepared, and if an original drawing is to be copied, it is done by the artist in lithographic crayon on this plate; autographic writing done with the crayon, lithographs, and fresh proofs of wood or copper-plate engravings, must be transferred in the usual way to the surface of the plate; and while still wet, an ink-roller is passed over, to give a deeper impression. Rosin very finely powdered is then sifted over, which adheres to the wet ink, and becomes consolidated, so that the superfluous powder is easily brushed off from the parts not covered with ink. The plate is next placed with its face upward in a shallow trough containing dilute sulphuric or hydrochloric acid sufficient to slightly cover it; the trough is then gently rocked, to make the acid flow forward and backward over the plate, and if this be continued some time—an hour or more—all the parts of the plate not covered with the ink and rosin are etched deep enough to be used as a relief-plate for printing from. In impressions where there are large interspaces, it is usual to saw them out; and in some cases, where it is found that the relief is not sufficiently high, the raised parts are re-inked, and again covered with the rosin, and submitted a second time to the action of the acid. By the aid of photo-lithography (see PHOTOGRAPHY), ordinary pen-and-ink drawings on paper or card-board, and ordinarily printed copies of engravings of any kind, may be reproduced by this process. One great advantage of this method is that the original drawing may be made as large as convenient,

and reduced to the required size when photographed. By this means a much finer result can be obtained than would be possible if the drawing had to be executed of the exact size required. A slight pressure will then easily produce a copy on the polished zinc-plate, which is perfected by the subsequent operations.

ZINGARELLI, Nicolo Antonio: Italian composer: b. Naples 1752, Apr. 4; d. there 1837, May 5. He studied at the Conservatorio di Loreto and also under the Abbate Speranza, and on leaving the conservatory received the place of master of the chapel at Torre dell' Annunziata. In 1781 he composed for the Theatre San Carlos, in Naples, his opera *Montezuma,* and in 1785 brought forward his *Alzinda* in La Scala, Milan, with great success. In this work he adopted a more simple and easy style. His best operas are *Pirro, Artaserse,* and *Romeo e Giulietta.* In 1789 he brought out his *Antigone,* from Marmontel in Paris; but the public events then occurring absorbed the attention of the public, and he soon returned to Italy, where he became director of the Vatican chapel. About 1812 he was appointed director of the musical academy of San Sebastiano, and in 1816 chapel-master in St. Peter's. Zingarelli composed much church music, and his works are highly esteemed for their expression. From 1781 he wrote about 40 operas, many melodies from which have continued to be interpolated in modern Italian productions.

ZINGARO, n. *zĭng'gâ-rō,* Zingari, n. plu. *zĭng'gâ-rē* [It.]: a gypsy.

ZINGEL, *zĭng'ĕl:* a fish of the genus *Aspro* and family *Percidæ* (the perches), remarkable for the elongated form of the body, and for having the mouth situated under the projecting and rounded snout, also for the roughness of their scales. The dorsal fins are widely separated, and the ventral fins are large. Only two species of *Aspro* are known: of which one, the *Zingel* of the Danube (*A. zingel*), attains a length of 15 in. and a weight of 2 or 3 lbs.; the other (*A. vulgaris*), 6 or 7 in. long, is found in the Rhone and its tributaries, also in more e. rivers of Europe. Both are esteemed for the table.

ZINGERLE (von Sommersberg), *tsĭng'ĕr-lĕ,* Ignaz Vincenz: Austrian Teutonic scholar: b. Meran 1825, June 6; d. Innsbruck 1892, Sep. 17. He was a nephew of Pius (q.v.). He studied at Innsbruck and (theology) Brixen, and from 1859 until his retirement in 1890 was professor of German language and literature at Innsbruck. Among his works are *Sagen aus Tirol* (2d ed. 1891); *Sitten, Bräuche, und Meinungen des Tiroler Volkes* (2d ed. 1871); *Schildereien aus Tirol* (1875-88); and *Der Bauer von Longvall* (1874).

ZINGERLE, Pius: Austrian Orientalist and Catholic theologian: b. Meran 1801, Mar. 17; d. Marienberg

cloister 1881, Jan. 10. He studied at Innsbruck, became in 1862 professor of Oriental languages in the Sapienza at Rome, and in 1867-71 was director of the gymnasium at Meran. Among his works are *Ausgewählte Schriften des Heiligen Kirchenvaters Ephräm* (2d ed. 1845-6); *Akten der Heiligen Märtyrer des Morgenlandes* (1836); *Chrestomathia Syriaca* (1871); and *Lexicon Syriacum*.

ZINGIAN, a. *zĭn'jĭ-an* [etym. doubt.]: in *philol.*, a name sometimes given to the s. African family of languages; called also Bantu and Chuana. A peculiarity of this family is the use of clucks or clicks in speaking.

ZINGIBERA'CEÆ: see SCITAMINEÆ.

ZINNIA, *zĭn'nĭ-a:* genus of annual plants, of the order *Compositæ*, natives of warmer parts of America, and much cultivated for ornament. In nature only the outer or 'ray' florets of the head of flowers are petal-like; but since about 1856 very many cultivated double varieties have been produced, resembling in the form of the heads the most perfect dahlias, and of all colors, white, orange, scarlet, etc. The so-called zebra zinnias have the same head striped or blotched with different hues of crimson or rose, pink, violet, yellow, white, etc. The improved dwarf varieties have flowers of great size. The 'pigmy Mexican,' only 5-7 in. high, bears on each plant a hundred or more flowers of intense orange, and may be used as a border plant. The 'double Pompone' has conical heads. There is also a trailing variety. A small-flowered yellow species (*Z. pauciflora*) of Peru has been long known in cultivation. *Z. grandiflora,* with narrow leaves, occurs in the Rocky Mountains; and the red *Z. multiflora* has run wild in the s. states. The best known species is the garden zinnia or youth-and-old-age (*Z. elegans*), an erect annual usually about 18 in. tall and originally bearing yellow or orange flowers, but now exhibiting nearly every tint except blue and green in both single and double forms, which often exceed 3 in. in diameter. *Z. haageana* was introduced into cultivation in 1861, but being less showy and smaller than *Z. elegans* is of secondary importance. A hybrid race developed from these two species, and known as *Z. darwini*, has been developed, but has not become widely popular in America. The plants are rather stiff, formal, and coarse in habit, and their colors, although brilliant and metallic, lack the delicacy of the dahlia and the china aster, to which they are not distantly related. They are, however, among the most useful garden annuals, because they will thrive upon almost any kind of soil and yield a profusion of bloom from midsummer until frost. They are readily propogated by means of seed sown in the open air, or for earlier bloom under glass, the seedlings being transplanted to permanent quarters at distances of from one to two feet, according to the size the variety generally attains. Except the usual clean cultivation of the soil no special care is required.

ZINZENDORF, *zin'zen-dorf*, Ger. *tsin'tsen-dorf*, Nicolaus Ludwig, Count von Zinzendorf and Pottendorf, religious reformer, founder of the existing sect of the Moravian Brethren (q.v.) or Herrnhuters: 1700, May 26—1760, May 9; b. Dresden; descended from an ancient family in Lower Austria, which had taken the Prot. side in the Reformation. His father, a Saxon state minister, died while Z. was a child, and Z. was educated by his grandmother, a learned and pious lady, Baroness von Gersdorf. Spener, the head of the Pietists, was a frequent visitor at her house, and his conversation, and the devotional exercises in which Z. took part, influenced his character while a mere child. In 1710 he went to Halle, where he spent six years, under the special care of Franeke, the philanthropist. Z. founded among his fellow-pupils a religious society, to which he gave the name 'Order of the Grain of Mustard-seed.' In 1716 he was sent by his relatives to Wittenberg, where Pietism was in less repute than at Halle; but he adhered to his early religious impressions. Two years afterward, he travelled through Holland and France, everywhere endeavoring to convert the distinguished persons whom he met to his own religious views. On his return to Dresden, he was appointed a member of the Saxon state council, and married the sister of the Count Reuss von Ebersdorf. At court he openly confessed Christ, and kept his life pure. But political life was little to his mind, and he returned to his country-seat in Upper Lusatia, having resolved to settle down as a Christian landowner, spending his life among and in behalf of his tenantry. He intended to develop practically the Pietist ideas of Spener (q.v.: see also Pietism). His aim was not to found a new church separate from the national Lutheranism; but rather to stir the torpid orthodoxy of the established church by the influence of an active association devoted to itinerant evangelical preaching, tract-distribution, religious correspondence, education, and practical benevolence. At his country-seat, Berthelsdorf, he accidentally met a wandering carpenter, Christian David, a member of the old sect of Moravian Brethren, of whom some still remained in Moravia, professing the doctrines taught by John Huss. David described the persecutions to which the sect were exposed; and Z. invited him and his friends to settle on his estate. They accepted the proposal, and the colony received the name 'Herrnhut.' Z. acted with great liberality to the settlers, and their success attracted much attention. In 1734 Z. went under a feigned name to Stralsund to pass an examination in theology, and was ordained a minister of the Lutheran Church. In 1736 he was banished from Saxony, on a charge of introducing dangerous novelties in religion; but this aided to extend his influence. In 1749 the Saxon govt. rescinded this decree, and requested him to establish other settlements of Moravians, like Herrnhut. He repaired to Holland, where he founded a Moravian colony, and afterward to Esthonia and Livonia, where also he founded colonies. In 1737, at

the request of King Frederick-William I. of Prussia, Z. was ordained bp. of the Moravians. In the same year he went to London, where he was received with much consideration by Wesley. In 1741 he went to N. America, accompanied by his daughter, and founded the celebrated Moravian colony of Bethlehem, Penn. The Herrnhuters, in the meanwhile, by their good conduct and industry had won the respect of all classes in Saxony, and in 1747 Z. was allowed to return to Herrnhut. Having received authority by act of the Brit. parliament to establish Moravian settlements in the English colonies of N. America, he returned thither to do so. He finally settled at Herrnhut; and, his first wife being dead, married Anne Nitschmann, one of the earliest colonists from Moravia.—Z. was author of more than 100 works in verse and prose. Selections of his hymns are used in worship by the Moravians: some of his poetry is objectionable as giving too sensuous expression to pious feelings. The same may be said of his sermons, especially of those which refer to the Holy Ghost as a spiritual mother. His writings are often incoherent or mystical, but they abound with passages containing deep and original thought.—Z. was a man of mighty faith. While he disliked the stiff Lutheran orthodoxy, he saw the shallowness of the rationalism which was attacking it; and made it his work to point men to the personal historical Christ as the supreme manifestation of the Father in heaven. His natural ardor sometimes led him to press his doctrinal statements beyond scriptural limits, and to decide questions on an appeal to his feelings, and to act with a zeal whose force was like fire; but he had a splendid nobleness of character, a great love for his fellow-men, a readiness for self-sacrifice in doing good, a high conception of the Christian calling, and a devoted affection for the personal Lord Jesus, which mark him as one of the princes in the kingdom of God on earth. His great estate was nearly all expended in a work which was his delight—the founding and maintaining the Moravian Brethren as 'a little church within a church.' —There are Lives of Z. by Spangenberg (1775), Varnhagen von Ense (in his *Biographische Denkmale*, 1830), and Burkhardt (1876); also many others.

ZION, n. *zī'ŏn:* hill in Jerusalem, which was the royal residence of King David and his successors; hence, *figuratively*, the Church of God. Mount *Zion* was in the s.w. part of Jerusalem, and on it stood the City of David, or Upper City, with the citadel of David. At the present day only the n. half belongs to the city, the city wall running obliquely over the hill. On the w., and still more on the s. side, it descends steeply into the vale of Hinnom, 300 ft. below. Mount Z. is 2,537 ft. above the Mediterranean Sea. With the prophets and poets of the Old Test. Z often stands for the whole of Jerusalem (also called 'Daughter of Zion'), particularly in reference to the Temple. See JERUSALEM.

ZIONISM. The origin of the idea of the Jews' restoration to Palestine is not difficult to ascertain—if its roots have been held by tradition to exist in the Scrip-

tures, circumstance has given it importance and continuance in the beliefs of the pious. It is not surprising that after the loss of home and nationality, and facing long centuries of persecution and disfranchisement, the Jew should have harbored the desire of peace and security in a land identified with his history and triumphs. Even if this hope in its national form cannot be regarded as among the few universally accepted dogmas in Jewish theology, it has been associated with the coming of the Messiah when Jerusalem was to be the center of the world's enlightenment. There can be little doubt that this belief, which was most ardently cherished in periods of disaster and humiliation, was largely affected by the spirit of the Crusades, so much so, in fact, that pilgrimages to the Holy Land became more common, while extravagant powers were attributed to its soil. There began to be cherished, too, with more confidence, the idea of a Jewish state, and some fantastic projects followed, which ended abruptly, without practical result. Paper schemes of colonization and restoration were common in the past century, some honestly meant, but others to gain notoriety or prove the lunacy of their originators. Zionism, to-day, is associated with the movement begun by Theodor Herzl (2 May, 1860 — 3 July, 1904), and has gained for itself world-wide attention, even if its aspirations have not yet been realized. Influenced partly by anti-Semitism in Austria and Russia, and partly by the developments in the Dreyfus case, Theodor Herzl, a noted Viennese journalist, wrote in Paris in 1895 a little work, his 'Judenstaat,' which was published in Vienna the following year, appearing soon not only in many German editions but also in Hebrew, French, and English translations. Upon his theories the present Zionistic movement is essentially based. Believing that the Jew can be preserved only by separation from influences that tend toward his assimilation and absorption, he advocated the formation of a "Society of Jews," to undertake the preliminary political and scientific work, and a "Jewish Company," similar to the French and English trading companies, with a capital of $50,000,000 and its center in London, to finance the enterprise. He suggested either Argentina or Palestine as territory, wherein a secure home might be established. In 1896, Herzl presented his project in person to the London Jewish community, arousing comparatively little approval at the time. Despite opposition from all quarters, he felt sufficiently encouraged by prominent adhesions in Europe, Max Nordau among the number, to call the first Zionist Congress at Basle in 1897, which was followed by similar gatherings in following years, which have brought Zionism prominently before the world, with the avowed purpose of organizing a Jewish state, preferably in Palestine. The largest support to the project came from the Russian Jews, at home or abroad,

who had endured so much persecution, and from the Jews of Austro-Hungary, who had heavy exactions to suffer from anti-Semitism. Comparatively little aid was furnished by the Jews in Great Britain, the United States, France, or Germany. From the beginning varied elements entered Zionism — with some it was merely a philanthropic movement to provide relief for persecuted Israel, with others it was a colonizing project in any favored land, where Jews might return to the soil and become agriculturists like their ancestors: but with an emphatic majority it was a political movement to establish a "legally, publicly assured home" in Palestine, by purchase of land from the Sultan and under the protection of the Powers. Herzl's interview with the Sultan and the German Emperor, his repeated visits to Italy, France, England, were unavailing, and he died in 1904 somewhat discouraged at the want of success. In the same year the English government offered to place at the disposal of the Zionists a tract of land in East Africa, with local self-government for the people under a Jewish Governor and a British Protectorate. The offer having been rejected, and some of Herzl's followers chafing at the delay, a new organization has been formed in London, with branches throughout the globe, with Israel Zangwill, the novelist, at its head, whose object is to attempt colonization in any feasible quarter and not wait for the settlement of Palestine. This element is termed the Territorialists. The rank and file of the Zionists, however, favor unqualifiedly the original Basel program of a state in Palestine. Meanwhile the association formed by the late Baron de Hirsch, with practically unlimited means at its disposal, prefers to aid deserving settlements and agriculturists in all parts of the world, not limiting itself to Palestine. As to the present status and prospects of Zionism the movement proper has not recovered from the loss occasioned by Dr. Herzl's death and divided counsels only increase its weakness. While, however, a Jewish state is more remote than ever, Zionism has done much to acquaint the world with the wretchedness from which millions of Jews suffer in benighted lands and in encouraging agriculture and education it is doing its utmost to uplift the Jew and secure relief from oppression.

ZIPPEITE, n. *zĭp'pē-īt* [after *Zippe*, a Bohemian mineralogist]: a variety of uranic ochre or hydrated sulphate of urania.

ZIRCON, n. *zĕr'kŏn* [Cingalese]: a heavy, hard, sparkling mineral (SiO_2ZrO_2), more or less transparent, found colorless and of various colors—yellow, brown, red. Colorless varieties are often sold as diamonds. The reddish-orange variety is sometimes called *hyacinth* by jewellers. Zircon is slightly harder than quartz. In Ceylon the pale or smoky variety is called *jargon*. ZIRCONIA, n. *zĕr-kō'nĭ-a*, a white tasteless powder (ZrO_2) obtained from zircon, which acts both as a base and as an acid. ZIRCONITE, n. *zĕr'kŏn-īt*, a grayish or reddish-brown and nearly opaque variety of zircon. ZIRCONIA LIGHT, intensely bright light produced by the action of oxygen and a highly sulphuretted gas on zircon cones, instead of on the lime bells used in producing oxyhydrogen or lime light. Zirconia, or oxide of zirconium, when highly heated emits a very strong light, and its resistance to disintegration even after prolonged ignition makes it preferable to lime in the oxyhydrogen light. A burner was some time ago devised by Linnemann expressly for the use of zirconia; but it had certain defects: it has since been very much improved by Wolz, of Bonn, and the new form is said to be well adapted for its purpose. In such burners the oxygen must be supplied at sufficient pressure to cause combustion of the mixed gases (oxygen and coal-gas or hydrogen) to take place as they issue from the burner, 0·5—1·0 centimetre (about 0·19—0·39 in.) above its mouth, in order to obtain a conical flame of the highest intensity which shall not cause the burner to be overheated. This pressure of the oxygen is about 15 times that of the coal-gas. Large burners have not proved economical in practice, because the large central stream of oxygen that issues from them does not mix rapidly and thoroughly enough with the issuing stream of coal-gas; and complete immediate consumption of the gases is the essential condition of success. This imperfection can readily be detected when one observes the flame through smoked glass: then the point at which unconsumed oxygen impinges on the incandescent zirconia is seen as a black spot.

The best zirconia cones are made as pure as possible, and molded into cylinders 2 centimetres (about 0·79 in.) long and 0·8 centimetres (about 0·31 in.) diameter. When heated with 30 litres (litre = 61 cubic in.) of oxygen per hour and the same amount of coal-gas, they yield a light equivalent to 40–50 candles. With equal expenditure of coal-gas the ordinary gas-burner produces less than $\frac{1}{40}$ as much light as the oxyhydrogen zirconia light.

ZIRCONIUM, *zĕr kō'nĭ-ŭm* (symb. Zr, at. wt. 90): the metallic constituent of the earth *zirconia*, which is found in association with silica in the precious minerals *zircon* and *hyacinth;* also in eudialyte, fergusonite, and several other compounds. It was first isolated by Berzelius 1824, and has little lustre when burnished. In crystals it resembles antimony. Commonly it is obtained as a black powder. The sources from which Z. is derived are few; its compounds are found in Ceylon, the Ural, s. Norway, and the United States e.g., fergusonite in Mass. and N. Carolina.

ZIRKNITZ (or CZIRKNITZ), *tsĭrk' nits*, LAKE (Ger. *Czirknitzersee, Lacus Lugeus* of Strabo): small lake of Austria, in Carniola, about 20 m. s.s.w. of Laibach, 30 m. e.n.e. of Trieste: in a deep valley s. of Mt. Javornik, and n.e. of Mt. Slivinza. The lake is about 5 m. long, and between 2 and 3 broad, is surrounded with numerous villages, chapels, and castles, contains four small islands—on the largest of which is built the hamlet of Ottok—and has no surface outlet. It is about 56 ft. deep in the deepest part, and is very irregular in shape. It is notable only for the remarkable phenomenon of the occasional disappearance of its waters for several weeks, and even months, during which the bottom is often covered with luxuriant herbage, which the peasants make into hay; sometimes also they manage even to sow and reap a small crop of buckwheat in its deserted bed. The waters, however, are not perfectly regular in their disappearance—indeed, sometimes for five or six years together they have not retired at all—but usually they drain off in the end of Aug., and return, if the season be wet, in five or six weeks. It takes between 20 and 25 days to empty the lake, but the return of the waters is sudden and unexpected, its basin being refilled sometimes in 24 hours. The phenomenon is accounted for by the nature of the bed of the lake, which is of limestone, and, like all the Carniolaic plateau, is full of deep fissures and caverns, through which the waters disappear at irregular intervals, returning when the rain sets in. Some of these openings are 50 ft. deep, and the chief ones are known to the peasantry by particular names. They communicate with subterranean reservoirs, penetrating the interior of the surrounding mountains, through which the waters are replenished or drawn off. There are 12 of these openings which discharge water into the lake as well as draw it off, and 28 which draw it off only. Through the former of these the water pours in after rainy weather as from a spout. When the surface of the lake reaches the caverns of Velka-Karlanza and Malka-Karlanza, the waters are discharged by these into the valley of St. Canzian, and, after disappearing several times, fall into the Unz, above Planina. Sometimes, however, the volume of water is so great that these caverns prove insufficient to carry it off, when the lake overflows and covers the neighboring country, sometimes submerging villages. In 1834, Jan., the lake was drained, and remained perfectly dry till 1835, Feb.—an occurrence without parallel in its history. The lake is stocked with fish, and at certain times is the resort of great numbers of waterfowl.—There is a small village of Z. on a small stream that falls into the n. side of the lake.

ZISKA, *zĭs'kâ* (or ZIZ'KA), JOHN, of Trocznov: famous leader of the Hussites: about 1360–1424, Oct. 11; b. Trocznov, in the circle of Budweis, Bohemia; of noble descent. He became a page to King Wenceslas of Bohemia, but his thoughtful temperament unfitted him, while a mere boy, for the frivolous occupations about court; so, entering on the career of arms, he served as a volunteer in the English army in France, and afterward was in the dreadful bat-

tle of Grünwald, near Tannenberg (in which the grand master and 40,000 knights, it is said, were left dead on the field). In the war Z. had lost his right eye; though the assertion that he was called Z. on this account is a mistake, as Ziska does not in either Bohemian or Polish mean 'one eyed,' and his family had borne the name for generations. His restless spirit led him to join the Austrians against the Turks, and subsequently the English against the French; and returning to Bohemia soon after the murder of John Huss (q.v.), he became chamberlain to King Wenceslas. Z. was an adherent of the Hussite doctrine; and the tragical fate of its apostle, with the tyrannical cruelties exercised by the imperial and papal officers on its adherents, excited in his mind the liveliest indignation and resentment. A similar sentiment, originating as much from patriotic as from religious feelings, pervaded the kingdom; and a powerful party was soon formed, which urged on the king a policy of resistance to the decisions of the Council of Constance. Z. soon became prominent among the leaders of this party, and his personal influence with the king gained for it the latter's sanction to offer resistance, though the king's vacillating disposition incapacitated him from giving effect to his own honest convictions, and taking open part with his subjects against their oppressors. After the outbreak at Prague (1419, July 30), in which the violent behavior of the Rom. Catholics was avenged by the precipitation of 13 magistrates from the Council windows, Z. was unanimously chosen leader of the Hussites, and the first great religious conflict of Germany began in earnest. The shock produced by news of this outbreak was fatal to Wenceslas; and his death gave more of a political character to the contest, as when his brother, Emperor Sigismund (the same who had allowed his safe-conduct to Huss to be violated), attempted, by advancing an army of 40,000 men into the country, to obtain the throne, his project was frustrated for a time by the Hussites, who insisted on their religious and political liberties being secured, and totally defeated his army with a hastily levied force of not more than 4,000. On the retirement of the imperialists, Z. completed his conquest of Bohemia by the capture of the castle of Prague 1421 (the town had been taken in the spring of 1420), and secured his hold of the country by erecting fortresses, chief of which was that of Tabor, whence his party derived its name *Taborites* (q.v.). The varied experience acquired by Z. in foreign warfare was now of immense service to his party; his followers were armed with small firearms (then little known); and his almost total deficiency in cavalry was compensated for by the introduction of the *Wagenburg* (or 'cart-fort,' constructed of the baggage-wagons), to protect his little army from the charges of the mail-clad knights. Numerous other inventions and ingenious contrivances mark Z.'s brief career as leader of the Hussites, and show his eminent qualities as an engineer and a general. In 1421 he lost his remaining eye at the siege of the castle of Rabi; but though now totally blind, he continued to lead his troops to a succession of victories almost unexampled in history—

the list of 13 pitched battles fought by him, always with much inferior force, including only one defeat, and that so much resembling a drawn battle, that his opponents dared not molest his retreat. His greatest achievements were the rout (1422, Jan. 18) of Sigismund's second invading army, which was driven into Moravia, and 2,000 men of it drowned in attempting to escape across the frozen Iglau; and his great victory at Aussig, over the German crusading army, commanded by Frederick the Warlike of Saxony and the Elector of Brandenburg. In the latter conflict the furious onset of Z.'s troops was steadily sustained by the Saxons, who were choice troops, and the fanatic Hussites recoiled in astonishment at a successful resistance which they had never before encountered. Z., apprised of the situation, approached on his cart, thanked his men for their past services, adding, 'and if you have now done your utmost, let us retire.' Thus stimulated, they made a second charge still more furious than before, broke the Saxon array, and left 9,000 of it dead on the field. Sigismund became convinced that the conquest of Bohemia was impossible, and after a time proposed an arrangement with the Hussites, by which full religious liberty was allowed; and Z., who had an interview with the emperor on the footing of an independent chief, was to be appointed gov. of Bohemia and her dependencies. But the war-worn chief did not live long enough to complete the treaty, for, while besieging the castle of Przibislav, he was seized with the plague, and died. He was buried in a church at Czaslav, and his iron war-club was hung up over his tomb. A foolish story was long current that, in accordance with Z.'s express injunctions, his skin was flayed off, tanned, and used as a cover for a drum, which was afterward employed in the Hussite army; in order that even when dead he might be a terror to his enemies.

The only accusation which can with justice be made against Z. is on the ground of cruelty, the victims being the monks and priests who fell into his hands. But it was an age when inhumanity was general; and most atrocious cruelties were without hesitation or scruple practiced on the Hussites, and it was not to be expected that the weaker party should set the example of moderation.

ZITHER, n. *zith'ėr*, or ZITH'ERN, n. *-ėrn* [from same root as CITHERN, which see]: a stringed musical instrument having 28 and sometimes 31 strings.—The *Zither* or cithern is the modern representative of the ancient *cithara*, and is a popular and common instrument in Tyrol (q.v.). It is a flat stringed instrument, having a wooden frame and flat sounding-board, with brass strings. When to be used it is placed on a table or on the knees, and the strings are played by the right hand, the thumb being armed with a metallic *plectrum* to bring out the melody more prominently.

ZITTAU, Germany: a town of Saxony, on the Mandau, near the Austrian frontier, 49 m. by rail e.s.e. of Dresden. The chief public buildings are a splendid town-house, the churches of Saint Peter and Saint Paul, Saint John and Mary, hospitals, custom-house, gymnasium, a municipal museum, and a valuable library. Its principal manufactures are cotton-spinning, dress goods, iron-founding, machinery, stained glass, cycles, ropes, paper, brewing, and brick-making; and there is a trade in cotton and linen goods, chemicals, etc. There are a number of lignite mines in the neighborhood. Pop. (1900) 30,921.

ZITTEL, Karl Alfred von: German palæontologist and geologist: b. Bahlingen, Baden, 1839, Sep. 25; d. Munich, Bavaria, 1904, Jan. 6. After study at Heidelberg and Paris, he entered the geological survey at Vienna, in 1863 a lecturer in the university there, and in the same year professor of mineralogy at Karlsruhe. In 1866 he was made professor of palæontology and geology at Munich; and in 1899 president of the Bavarian Academy of Sciences and curator-general of the scientific collections of Bavaria. The Rohlfs expedition to Egypt and the Libyan desert in 1873-4 derived much of its value from his important labors. Among his publications are the *Paläontologische Studien über die Grenzschichten der Jura- und Kreideformation* (1868-83); *Aus der Urzeit* (1872; 2d ed. 1875); *Handbuch der Paläontologie* (with Schimper and Schenck 1876-93), the most complete and authoritative work in that field; and *Geschichte der Geologie und Paläontologie bis Ende des Neunzehten Jahrhunderts* (1899). He edited the periodical *Palæontographica.*

ZIWET, Alexander: American mathematician: b. Breslau, Germany, 1853, Feb. 8. Graduated from the Polytechnical School of Karlsruhe in 1880, he came in that year to the United States, and for some time was connected with the United States lake survey (Detroit) and the coast and geodetic survey (Washington). Subsequently he became successively instructor in, and junior professor of, mathematics in the University of Michigan. In 1892 he was made co-editor of the *Bulletin* of the American Mathematical Society. He published an *Elementary Treatise on Theoretical Mechanics* in three parts, as follows: Pt. I., *Kinematics* (1893); Pt. II., *Introduction to Dynamics, Statics* (1893); Pt. III., *Kinetics* (1894).

ZIZA'NIA: a genus of grasses including the wild rice.

ZIZ'YPHUS: a genus of *Rhamnaceæ,* shrubs or small trees, with spiny stipules, alternate three-nerved leaves, a spreading five-cleft calyx, five hood-like petals, five stamens, a five-angled disk, adhering to the tube of the calyx, and having enclosed within it the two-or three-celled ovary. Fruit a drupe, which is sometimes edible

and has a large stone or kernel containing from one to several flattened seeds. Zizyphus is widely distributed, but is chiefly indigenous to tropical Asia and America. The fruits of the cultivated *Z. jujuba,* and of *Z. sativa,* are of the size and shape of a small, oval plum. They ripen in Sep. when they are gathered and stored in a dry place, the pulp becoming sweeter by the process. They have a dark-red skin, but are yellow within. If carefully dried, these fruits, called jujubes, will keep for a long time, and retain their acid flavor, which has made them a refreshing dessert fruit, in the Mediterranean countries and in China. They are nutritive and demulcent, a cough medicine having been prepared from them, and formerly, the sweet-meat known as jujube paste, was made from the evaporated juice of jujube, and of gum-arabic; but now the jujube is displaced by the gum and by gelatine. *Z. sativa* is a handsome arborescent shrub, with small, varnished, oval leaves and greenish inconspicuous flowers, succeeded by the bright drupes. It is sometimes cultivated in the United States, being hardy as far north as Washington. The bark, in its native countries, was used medicinally, for fever and for sores; and it is also employed for tanning and for a dye-stuff like that of *Z. xylopyra* which yields a black dye. Various parts of other species yield medicines, and the edible fruits of *Z. baclei* of Africa are used for a pleasant drink and are also made into bread. *Z. lotus* is by some believed to be the lotus-tree, the fruit of which produced such indolence in those who ate them. It grows in Barbary, where it is called sadr. *Z. spinachristi* is a small, prickly tree, which is reputed to have composed Christ's crown of thorns. Like many other spiny species of Zizyphus, this is a good hedge plant. *Z. nummularia* of Persia and India is one of the camel's thorns, whose foliage forms a fodder, and which has edible fruits. The cog-wood of Jamaica, an important timber tree, is *Z. chloroxylon.*

ZLATOUST, *zlâ-tôst',* or KLIUCHI (Golden Mouth): town of Russia, govt. of Ufa, among the Ural Mountains, about 150 m. n.e. of Ufa, on the river Ufa. It consists chiefly of wooden houses, and the inhabitants are mostly miners. It is the centre of the iron and gold mines of the district. There is an extensive manufactory of sword-blades, considered the best in the empire; other articles of inlaid and embossed steel are manufactured.—Pop. 22,000.

ZMEINOGORSK, *zmā-nō-gorsk',* or ZMIEF, *zmē-ĕf:* town of Siberia, in a mountainous dist. of the govt. of Tomsk, more than 350 m. s.w. of the town of Tomsk, on the river Smievka. The town is in the vicinity of one of the most productive silver mines in Siberia, discovered 1736, crown property since 1745. Since its discovery it has yielded nearly half of all the silver produced by the Siberian mines.—Pop. 7,000.

ZNAIM, or Znaym, *znīm* or *tsnīm:* town of the Austrian Empire, in Moravia, on a rising ground close to the left bank of the Taja, 45 m. n.-by-w. from Vienna. It is notable for the conflict between the French and the Austrians 1809, June 14, in which the French were victorious (see Wagram). A castle on a height, ancient residence of the princes of Moravia, is now a military hospital. Pop. (1900) 16,239, chiefly of German origin.

ZOAN, *zō'an:* ancient city of Egypt, on the delta of the Nile, 25 m. from the sea, 40 m. w. of Pelusium. It was the Avaris of the Egyptian historian Manetho, and was called Tanis by the Greeks and Romans. The present name is San. It is mentioned in the Old Test. as built seven years after Hebron. Probably it was rebuilt by the 'shepherd kings,' who made it their capital for about 500 years, B.C. 2000 to 1500, or somewhat earlier. A recently discovered inscription renders it probable that the city was the residence of the Pharaoh of the book of Exodus, and thus harmonizes with Psalm lxxiii. —'Marvellous things did he in the sight of their fathers, in the land of Egypt, in the field of Zoan.' By Strabo it is spoken of as a large city, about B.C. 24, though it began to decline 600 years before. Josephus, about A.D. 80, however, speaks of it as small. The ruins of the city, occupying three-quarters of a sq.m., are 1 m. e. of the present village, and buried under mounds. The French explorer Mariette made extensive excavations, identifying the site as that of the Hyksos capital, uncovering the remains of a great temple of granite and many large obelisks, and accumulating many treasures for the Egyptian museum at Boolak. The 'Canopus Stone' was discovered there 1865, and, like the Rosetta Stone, found 1799, has an inscription in three languages —the hieroglyphic, the cursive Egyptian, and Greek. The name Zoan occurs in the prophecies of Isaiah, in which rebukes of it are uttered; and the desolation of the city was predicted by Ezekiel. It is said that the villagers of San still show the Semitic features derived from the Arabic or Canaanitish invaders under the shepherd kings.

ZOANTHROPY, n. *zō-ăn'thro-pĭ* [prefix *zo-;* Gr. *anthrōpos,* a man]: in *pathol.,* a kind of monomania in which the patient believes himself transformed into one of the lower animals. Lycanthropy comes under this head.

ZOAR, *zō'ár:* village in Ohio, 90 m. e.n.e. of Columbus, settled 1817, by a German community, 'The Society of Separatists of Zoar,' established 1817, who held in common 9,000 acres of land; they had a woolen factory, mills, a store, church, school, and other social and industrial establishments, all managed by trustees, elected by popular vote. In 1897 the association disbanded, when the property was divided among 136 persons.

ZOAR, *zō'ėr:* the one of the five 'cities of the plain' which was not destroyed in the catastrophe that fell on the others, Sodom, Gomorrah, Admah, and Zeboim. As appears from Gen. xiv., the name of the city was Bela, but it was changed to Zoar (Gen. xix.), signifying 'little,' in reference to Lot's request, 'Behold now, this city is near to flee unto, and it is a little one'—in consequence of which request it was spared. Its probable destruction at some time subsequently accounts for Hebrew traditions that all the five cities were overwhelmed. Many suppositions have been entertained as to the location of the cities. Until in comparatively recent times it was believed that the site was at or near the southern end of the Dead Sea, perhaps covered by the shallow waters there. Objections to this view are that (Gen. xiii.) it was visible from Bethel, and was in the plain of Jordan; also that it was visible to Abraham from 'his place' Hebron, and to Moses, who from Pisgah saw 'the plain of the valley of Jericho, the city of palm trees, unto Zoar.' *Smith's Bible Dictionary* assigns the site to the n. end of the Dead Sea, and Selah Merrill believed that he had found some remains of the city there. One of these ruins has an un-Arabic name resembling a Hebrew word that means 'little.' As to the natural means employed for the catastrophe, the plain is described in the Bible as one of great fertility before the event, and after it a land of brimstone and salt and burning: brimstone and fire were rained upon it, and the morning after the destruction smoke went up as the smoke of a furnace. Large quantities of asphaltum were thrown up from the Dead Sea in the earthquakes of 1834 and 37. See SODOM: DEAD SEA.

ZOBO, *zō'bō:* hybrid between the Yak and the common ox of India; common in w. parts of the Himalaya, and valued as a beast of burden, as well as for its milk and its flesh.

ZÖCKLER, OTTO: German Lutheran theologian: b. Grünberg, Hesse, 1833, May 27. He was educated in the universities of Giessen, Erlangen, and Berlin, became a lecturer at the first-named in 1857, and in 1863 professor of theology. In 1866 he was appointed professor at Griefswald, and in 1885 consistorial councillor. He is one of the leaders of the movement toward the establishment of a state church in Prussia. In 1882 he became editor of the *Evangelische Kirchenzeitung.* Among his works are: *Hieronymus, sein Leben und Wirken* (1865); commentaries to Chronicles, Job, Proverbs, Ecclesiastes, Canticles, and Daniel, in Lange's *Bibelwerk* (1866-72; Eng. trans. 1870 et seq.); *Das Kreuz Christi* (1875; Eng. trans. 1877); *Gottes Zeugen im Reich der Natur* (1881; Eng. trans. 1886); and *Biblische und Kirchenhistoriche Studien* (1893). For the *Kurzgefasstes Kommentar zum Alten und Neuen Testament und zu den Apokryphen* (1886 et seq.), which

he edited with Strack, he prepared the commentaries on the Old Testament apocryphal books, the Acts, and the epistles to the Thessalonians and Galatians.

ZOCLE, *zō'kl*, or SOCLE, *sō'kl:* in architecture, square plain plinth under the base of a column.

ZODIAC, n. *zō'dĭ-ăk* [F. *zodiaque*—from Gr. *zōdĭakŏs*, the zodiac—from *zōdĭŏn*, a little animal, because the signs of the zodiac are represented principally by the figures of animals—from *zōŏn*, an animal]: an imaginary broad belt in the heavens, extending about 8° on each side of the ecliptic, within which the apparent motions of the sun, moon, and the most conspicuous of the planets, being those known to the ancients, are confined—divided into 12 parts, called *signs of the zodiac*. ZODIACAL, a. *zō-dī'a-kal*, relating to the zodiac.—The Zodiac, was rudely shaken, for it was found that planets of comprehending the paths of the sun and of the five planets (Mercury, Venus, Mars, Jupiter, and Saturn) which were then known; and as Mercury among all these has by far the greatest inclination of orbit to the ecliptic, and the value of that element in his case is only 7°. 0′ 9″, the width given to the Zodiac was amply sufficient for the required purpose. But when Ceres, Pallas, and Juno were discovered in the beginning of the 19th century, the idea which had been long seated in men's minds, that no planets existed beyond the limits of the Zodiac, was rudely shaken, for it was found that planets did exist which exhibited orbits inclined to the ecliptic at no less angles than 10° 36½′, 34° 42⅔′, and 13° 3⅓′; and the large number since observed have been found to wander from 0° to 18° beyond the Zodiac, from which fact they with the three above mentioned have been denominated *ultra-zodiacal* planets. The stars in Zodiac were grouped into 12 constellations, to each of which 30°, or $\frac{1}{12}$ of the whole circle, was assigned, though it often did not fill up that space, but was only situated in it; and this equable division into *signs* was of great advantage in defining the positions of the sun and planets at any epoch.

The constellations, with the appropriate symbols of the corresponding signs, are as follows:

1. Aries (*Ram*) ♈
2. Taurus (*Bull*) ♉
3. Gemini (*Twins*) ♊
4. Cancer (*Crab*) ♋
5. Leo (*Lion*) ♌
6. Virgo (*Virgin*) ♍
7. Libra (*Balance*) ♎
8. Scorpio (*Scorpion*) ♏
9. Sagittarius (*Archer*) ♐
10. Capricornus (*Goat*) ♑
11. Aquarius (*Water-bearer*) ♒
12. Pisces (*Fishes*) ♓

As one-half of the ecliptic is to the n., and the other to the s. of the equator, the line of intersection of their planes is a diameter of each, and the two points in which this line meets the celestial sphere are known as the equinoctial points. The comparative immobility, with respect to the ecliptic, of these points, suggested at once

the employment of one or other of them as a point from which to reckon; accordingly that point at which the sun crosses the equinoctial from s. to n. was fixed on, and called the first point (or commencement) of Aries. After the sun had advanced eastward through this sign —i.e., 30° along the ecliptic—he entered the sign of Taurus, continuing his course onward through the others in the order in which they are given above, again crossing the equinoctial southward at the point where he emerged from Virgo and entered Libra. This was the case with the sun during the time of Hipparchus; but though the equinoctial points move very slowly, yet they do so with great uniformity, and the westerly motion of 50″ annually which they describe along the ecliptic has at the present time separated the sign Aries from the constellation Aries, and caused the former to correspond almost to the constellation Pisces. This gradual retrogression of the signs through the constellations of the Zodiac will continue till they accomplish, in about 25,868 years, a complete circuit; after which period the sign and constellation of Aries will coincide, as they did in the time of Hipparchus. Neither the Zodiac nor its constellations are of much use now in astronomy, except that its constellations, like the others, afford an easy though somewhat fantastic nomenclature for the stars, and a rude but sometimes convenient mode of reference to their positions.

The porticoes of the temples of Denderah and Esne, in Egypt, have representations of the zodiacal constellations, which are of great antiquity and have formed a fruitful theme of discussion. Dupuis, in his *Origine des Cultes,* has, from a careful investigation of the position of these signs, and calculating precession at its usual rate (see PRECESSION OF THE EQUINOXES), arrived at the conclusion that the earliest of them dates from B.C. 4000. This conclusion is controverted by Fourier, in his *Recherches sur les Sciences, etc., de l'Egypte,* who makes the representations at Esne 1,800 years older than the other. That these representations are of late origin has been established by finding on them the cartouches of Tiberius and Nero. The Greeks seem to have borrowed their constellations from the Egyptians and Babylonians, and this is corroborated, to some extent, by occasional remarks in Greek writers as to the positions of various constellations at certain times, which positions are inconsistent with the supposition of the observer being in Greece. The zodiacal figures of the Hindus, ancient Persians, Chinese, and Japanese have such remarkable resemblance to those of the Egyptians that there can be little doubt as to their common origin.

ZODIACAL LIGHT, *zō-dī'a-kal:* a luminous elongated triangular tract of the sky, lying nearly in the ecliptic, seen after sunset or before sunrise, at all seasons of the year in low latitudes, but rarely in our latitude, except

in Apr. and May in the evenings, and six months later in the mornings. It is due probably to illuminated (partly, perhaps, self-luminous) matter, perhaps meteoric bodies, surrounding the sun in a very flat, lenticular form, nearly coinciding with the plane of the ecliptic, or rather with the sun's equator, and extending to a distance from the sun greater than that of the earth, since its apex is often seen more than 90° from the sun. It seems to have been distinctly pointed out first by Cassini, and was long regarded as the sun's *atmosphere*. This idea, however, is totally irreconcilable with mechanical principles; since, to assume so flat a form, in spite of the enormous attraction of the sun and its own elasticity, an atmosphere would have to revolve with a velocity so great as to dissipate it into space. The only conceivable explanation of the phenomenon is, therefore, in supposing it to consist (like the rings of Saturn) of an immense assemblage of small cosmical masses, rocks, stones, and pieces of metal, such as are continually encountering the earth in the form of aerolites or meteorites. For the dynamical stability of such a system, it is necessary only that each fragment should separately describe its elliptic orbit about the sun. The mutual perturbations of the system, on account of the enormous mass of the sun, would be exceedingly small, except in the case of actual collision; but some of the planets would have considerable effect on it. That this is the true explanation of the phenomenon is now generally believed. Some very curious recent observations on the Aug. and Nov. meteorites of 1866 have been considered to show that these bodies move in orbits almost exactly the same as those of two known comets. The comet, then, is merely that portion of the ring of small masses, all revolving nearly in the same orbit, where the greatest number are, for the time, collected; and it is possible that to the collisions, which must most frequently occur where the separate particles are most numerously grouped, are due the spectral phenomena of incandescent gases which have been observed in the heads of comets by Huggins and others. Such specula tions, were this the place to pursue them, might easily be extended to the sudden production, and changes of form, of the tails of comets which occur near perihelion, for there the separate masses must necessarily be much more crowded together, and their impacts must be increased both in number and violence.

ZOË, (Gr. Ζωή), empress of the East: b. about 978; d. 1050. She was the daughter of Constantine IX., and became the wife of Rosmanus III. in 1028. She became the murderess of her husband, in order to place Michael IV. on the throne. The latter dying, was succeeded by his nephew, Michael V., who was deposed by the people. Zoë and her sister Theodora were then proclaimed joint sovereigns. She displayed great ability and firmness in

the government, and in 1042 married Constantine IX., Monomachus. She reigned till her death.

ZOEPRAXISCOPE, n. *zō-ĕ-prăks'ĭ-skōp* [Gr. *zōē*, life; *praxis*, action, exercise; *skopeō*, I see]: a Zoögyroscope.

ZO'ETROPE: a mechanical toy, depending, for its interest on the constancy of visual impressions. It consists of a rotating drum, open at the top, in which around its inner periphery are placed strips of paper, having figures of men, animals, etc., in varying positions. By turning the cylinder the images are seen through slots in its upper side, giving the effect of action to the figures.

ZOG'BAUM, Rufus Fairchild: American artist: b. Charleston, S. C., 1849, Aug. 28. He studied at the Art Students' League (1878-9) and in Paris with Léon Bonnat (1880-2), made extensive study of European armies in field and garrison, and later became known as a leading delineator of military and naval subjects, which he renders with scrupulous fidelity to the various points in detail. His publications, written and illustrated by himself, are: *Horse, Foot, and Dragoons* (1887); *All Hands*, and *Ships and Sailors*.

ZO'HAR, or So'har: see Cabbala.

ZOILUS, *zō'ĭ-lŭs:* grammarian: b. at Amphipolis. Authorities vary respecting the age in which he lived, and the manner of his death. The usual account is that he lived in the time of Ptolemy Philadelphus, who reigned B.C. 285-247: and that he solicited, but without success, the patronage of that monarch. He gained notoriety for the bitterness with which he attacked Homer, whence he was surnamed *Homeromastix*, Homer's Scourge. His name is used proverbially for a malignant critic. All his works are lost.

ZOISITE, n. *zoy'sīt* [named after Baron von *Zois*]: a variety of epidote of a brownish color.

ZOLA, *zō'la*, Fr. *zōlâ*, Emile: French novelist: b. Paris 1840, Apr. 2; d. there 1902, Sep. 29. He was educated at the College of Aix, from which he went to the Lycée St. Louis at Paris with a scholarship in 1858. His career there was undistinguished, and he left in 1860 after failing to take his degree owing to insufficiency in literature. After a very brief experience as a clerk in a business house he was for more than a year compelled to sound the lowest depths of poverty in Paris, but in 1861 he obtained employment as a shopman with MM. Hachette, the publishers, at a salary of a pound a week. He devoted his spare time to literary work, contributing short stories to the *Petit Journal* and *La Vie Parisienne*, and critical articles to the *Salut Public* of Lyons and afterwards to Villemessant's journals, the *Evènement* and the *Figaro*. Several of his stories were published separately in the volumes *Contes*

à Ninon (1864), which contains some of his best and purest work, and which was followed in 1874 by *Nouveaux Contes à Ninon*. Some of his critical articles were collected under the title *Mes Haines* (1866). In *La Confession de Claude* (1865), a novel in which he utilized his early struggles, we find him already in full progress toward the characteristic work of his maturity, and this tendency became still more marked in the immediately succeeding novels: *Le Vœu d'une Morte* (1866); *Les Mystères de Marseille* (1867); *Thérèse Raquin* (1867), a powerful study of the effects of remorse following on adultery and murder; and *Madeleine Férat* (1868). Having by this time gained a secure footing in the world of letters, he conceived the plan of the series of novels known as *Les Rougon-Macquart*, which includes his best-known work and occupied him for nearly a quarter of a century. It is described as an *historie naturelle et sociale d'une famille sous le second empire*, and consists of 20 works dealing with different phases of modern life, not always strictly that of the Second Empire, but rather that of the Third Republic. The particular departments of life treated in the volumes were studied by Zola in the spirit of a scientific observer, but of one with a decided bias toward the portrayal of moral filth and disease; and the bond of connection which constitutes them a series is the persistence under various forms in all the members of the Rougon family of a moral taint which is transmitted in accordance with Zola's views of heredity. The series consists of the following works: *La Fortune des Rougon* (1871); *La Curée* (1874); *La Conquete de Plassans* (1874); *Le Ventre de Paris* (1875); treating of the Paris markets; *La Faute de l'Abbé Mouret* (1875), whose subject is clerical celibacy; *Son Excellence Eugène Rougon* (1876); *L'Assommoir* (1877), a powerful but revolting study of the effects of drunkenness and idleness, the first great success of the series; *Nana* (1880), a coarse picture of courtesan life; *Pot-Bouille* (1882); *Au Bonheur des Dames* (1883), dealing with the great shops of Paris; *La Joie de Vivre* (1883); *Germinal* (1885), treating of the life of French miners; *L'Œuvre* (1886), in which he dissects literary and artistic decadents; *La Terre* (1888), a study of the French peasantry in which prurient naturalism reaches the zenith of repulsiveness; *Le Rêve* (1888); *La Bête Humaine* (1890), treating of railways; *L'Argent* (1891), dealing with stockbrokers and company promoters; *La Débâcle* (1892), a powerfully realistic picture of military life in connection with the Franco-German war and the break-up of the Second Empire; and *Le Docteur Pascal* (1893), in which the whole is brought to a conclusion. Immediately after completing this huge undertaking he started the *Trois Villes* series, consisting of *Lourdes* (1894), *Rome* (1896), and *Paris* (1897), in

which he portrays the spiritual development of a priest, Pierre Froment, out of miraculous Christianity through a sort of social Catholicism into a creed of justice and labor. In the incomplete tetralogy entitled *Les Quatres Evangiles* (*The Four Gospels*) he proposed to formulate his social gospel. The first volume is *Fécondité* (1900), whose hero, Mathieu, is the son of the hero of the preceding series. The second volume, *Travail* (*Labor*, 1901), has a hero named Luc; and of the remaining two, *Vérité* (Truth) and *Justice*, whose heroes were to be named after the other two evangelists, the former was appearing at the time of his death. In the eyes of English readers Zola appears best in his short stories, of which, in addition to those already mentioned, collections entitled *Le Capitaine Burle* (1882), and *Naïs Micoulin* (1883) have been published. His famous story of *L'Attaque du Moulin* forms part of the volume of *Soirées de Médan* (1880), to which Maupassant and other friends also contributed. He defended his view of the nature and function of literary art and collected many critical articles in several works. Several of his novels were dramatized by himself and others, and he also wrote for the stage *Les Héritiers Rabourdin* (1874), and *Le Bouton de Rose* (1878), but none of them except *L'Assommoir* (1881), known in Charles Reade's English version as *Drink* (1879), were at all successful. Zola's chivalrous defense of Captain Dreyfus (q.v.) in 1898 led to his trial and condemnation to imprisonment and fine. He was created a knight of the Legion of Honor in 1888 and an officer in 1893, but after his condemnation in 1898 his name was removed from the roll. He was president of the Société des Gens de Lettres in 1891-4, but he was repeatedly refused admission to the Academy. Zola was the recognized head of the naturalistic school in fiction, but his followers were latterly few in number. His novels belong rather to the domain of science than to that of art. They are studies, in the main faithful enough though not free from distortion and exaggeration, in moral and social pathology; but they are not true to life and nature in the fullest sense, in the only sense which would entitle them to rank as artistic creations. Translations of the most important have appeared, chiefly by Vizetelly.

ZOLLNER, *tsöl'nėr*, KARL FRIEDRICH: German composer of popular song-music: 1800, Mar. 17—1860, Sep. 25; b. in the village of Mittelhausen, Weimar, where his father was chorister. At 14 years of age he entered the Thomas-school in Leipzig, and developed much musical talent, and then applied himself to theology in the univ. While a student in 1820 he held the position of singing teacher in the public free school. In 1822 he abandoned theology for the science of music, which he taught in various schools, lastly in the Thomas-school. His quartette-songs, such as *Miller-songs* and *The Gypsy*, made

his name popular. After his death in Leipzig, the various singing societies formed themselves into a Zöllner Union (Zöllnerbund), and in 1868 erected a monument to him in Rosenthal, near Leipzig.

ZOLLVEREIN, n. *zŏl'fĕr-īn* [Ger. *zoll*, duty; *verein*, union, coalition]: a customs-union; specifically, an agreement or union of different independent German states, under the leadership of Prussia, enabling them, in their commercial relations with other countries, to act as one state. When, after the war of liberation 1815, the political union, destroyed by the downfall of 'the holy Roman empire,' had been restored to a certain degree in the German 'Bund' (see GERMANY), internal commerce was felt to be trammelled and depressed by the collection of revenue at the frontiers of every petty state; nor was it possible, without united action, to carry out the policy in regard to foreign commerce which might be thought best for protecting and developing the native trade and manufactures. The first suggestion of such a union came from Prussia; but it took many years before an actual beginning was made, and still longer before it reached its ultimate extent, as the plan was opposed for a long time by the jealousies and special interests of many of the states.

From 1819 to 1828 only some of the minor principalities inclosed within the Prussian territories had been brought to conform to the Prussian commercial system; but 1828 Hesse-Darmstadt, and 1831 Hesse-Cassel, gave in. This was followed 1833 by the accession of Bavaria. Würtemberg, the kingdom of Saxony, the principality of the same name, Schwarzburg, and Reuss; and 1835-6 by that of Baden, Nassau, and Frankfurt-on-the-Main. The adhesion of Hanover did not take place till 1851, of Oldenburg till 1852. When, 1868, Lübeck and the two duchies of Mecklenburg had joined the Zollverein, its territory extended over the whole of what subsequently became the German empire, except Hamburg, Bremen, and a small part of Baden near Schaffhausen. The Reichsland of Alsace-Lorraine was incorporated 1871. The imperial constitution of 1871, Apr. 16, recognizes and ratifies the privilege of the free ports so to remain until 'they themselves demand admittance within the common customs-boundary.'

The principle of the Zollverein's action was this: The whole territory embraced by the Union formed commercially (in regard, at least, to countries beyond its limits) one state. The duties on exports, imports, and through-transports were collected at all the frontiers of the Union according to a uniform tariff (subject to some concessions, made on special grounds, to individual states); and the proceeds, after paying the expenses of collection, were divided among the members of the Union, in proportion to their several populations. In regard to the internal trade of the Union, as the duties

on articles manufactured for home consumption were different in the different states, a complicated system of drawbacks came into play, to put the commerce of all on equal footing.

The treaty of union was agreed on for a definite period of years, and was renewed from time to time, as in 1842, 53, 65, 67. In the latter year much was done to simplify the relations of the various states to one another in respect of internal trade; and the administration of the Zollverein was so modified as to give to the various members of the Union votes in its council and parliament proportionate to the number of inhabitants in each state.

Since the establishment of the German empire, the Zollverein has no longer a separate constitution of its own. Its council (representing governments) is merged in the federal council of the empire; its parliament (representing populations) in the reichstag. Affairs are managed on the principles adopted by the Zollverein 1867, by permanent committees of the federal council—viz., those for customs and taxes, for trade and commerce, and for finance.

The net income of the Zollverein, which 1834 was 12,178,761 thalers, had risen 1871, the last year in which the Zollverein had separate accounts, to 28,000,002 thalers (about $20,000,000).

ZOL'NAY, George Julian, American sculptor: b. Hungary, 1863, July 4. He was for a time in the civil service, but subsequently studied at the Imperial Academy of Fine Arts, and in 1892 came to America, where he was connected with the staff of sculptors of the World's Columbian Exposition. His work at the Nashville, Tenn., exposition of 1897 attracted considerable attention. Among important examples of his art are a tympanum for the University of Virginia, a bust of E. A. Poe for the same, a statue of Jefferson Davis at Richmond, Va., and numerous portrait busts.

ZOM'BA: capital of the British Central Africa protectorate, situated in Nyassaland, on the s. slope of Mt. Zoba, 10 m. w. of Lake Shirwa, at the height of about 3,000 ft. above the sea. Zomba is in telegraphic communication with the principal stations in Central Africa and Cape Town. A sanatorium has been built on a plateau 2,500 ft. higher up. The population is as yet small.

ZOMBOR, or Sombor, Hungary: a town of the comitat of Bács-Bodrog, on the Baczer or Franzens Canal, which unites the Theiss with the Danube, 65 m. s.w. of Szegedin. It has two Greek churches, a magnificent townhouse, and a public library, and carries on manufactures of silk. There is a large trade in cattle and corn. Pop. (1900) 29,609.

ZOMIDIN, n. *zō'mi-dĭn* [Gr. *zōmos,* broth; *eidos,* re-

semblance]: in *chem.,* Berzelius's name for that portion of the extract of meat which is insoluble in alcohol.

ZONA, n. *zō'na* [L.—from Gr. *zōnē,* a girdle—from *zōnnumi,* to gird]: in *pathol.,* a name for shingles.

ZONA LIBRE: a strip of country extending along the whole n. frontier of Mexico, 20 kilometers wide, where imported goods are admitted at 10 per cent of the ordinary duties for use within the zone. This zone was first established on the frontier of the state of Tamaulipas alone, in 1858, and was not extended across the whole frontier until 1885. At one time after the civil war, the U. S. authorities claimed that the privileges permitted within the zone encouraged smuggling; the Mexican government claims that the conditions of retail trade make the zone a necessity; opposition to the zone, however, exists among competing manufacturers in the interior of Mexico.

ZON'ARAS, Joannes: Byzantine historian of the first half of the 12th century A.D. He filled some distinguished offices about the imperial court, but gave himself up to a religious life as a monk of Saint Basil, employing his leisure hours in the compilation of a *History of the World from the Earliest Periods of the Year 1118.* In this work (of which an edition appeared at Paris in 1686) he follows principally the narrative of Dio Cassius, of whose first 20 books nothing is extant save Zonaras' abstract; but as he approaches his own times he becomes more entitled to attention, as his mistakes arise evidently more from ignorance than design. There is also extant a commentary on the apostolic canons by him. There is an edition of the *History* by Pinder (1841-4), with a third volume by Buttner-Wobst (1897).

ZONE, n. *zōn* [F. *zône*—from L. *zona;* Gr. *zōnē,* a belt or girdle—from *zōnnumi,* I gird: It. *zona*]: a belt or girdle; in *geography,* a climatic belt; one of the five great divisions of the earth's surface with respect to latitude and temperature, marked out by the two tropics and the polar circles, and respectively named the torrid zone, extending from tropic to tropic, from 23½° n. of the equator to 23½° s. of the equator; n. temperate zone, from the torrid zone n. to the n. polar circle; s. temperate zone, from the torrid zone s. to the s. polar circle; n. frigid zone, from the n. polar circle to the n. pole; and s. frigid zone, from the s. polar circle to the s. pole: in *math.,* the portion of the surface of a sphere included between two parallel planes; a band or stripe running round any object; a band or area encircling anything; in *OE.,* circumference. Zoned, a. *zōnd,* wearing a zone or girdle; having zones or concentric bands. Zone'less, a. *-lĕs,* destitute of a zone. Zonar, n. *zō'nėr,* or Zonnar, n. *zŏn'nėr,* a girdle which Christians and Jews are obliged to wear in certain Eastern countries to distin-

guish them from Mohammedans. ZONATE, n. *zō'nāt*, in *bot.*, marked with concentric undulations, bands, or zones. ZON'ULE, n. *zŏn'ūl*, a small zone or girdle; also ZON'ULET, n. *-ū-lĕt*.

ZONE-TARIFF SYSTEM, on Railways: system of charging a uniform passenger (and similarly freight) rate for all places within the same zone or belt as measured from some central point. The system originated in Hungary (where most of the railways are owned by the state), 1889, Aug. 1; and has proved popular and successful. Fourteen zones have been adopted, each of 25 kilometers (or about 15½ m.), Buda-Pesth being the central or starting-point, all places more than 350 kilometers from Buda-Pesth being included in the 14th zone, the fare for which (first-class) is 9 florins and 60 kreutzers on express trains, and 8 florins on ordinary trains. The system was introduced into Austria 1890, June 1, where there are 26 zones; the fare being 1 kreutzer per kilometer for third-class, 2 kreutzers per kilometer for second-class, and 3 kreutzers per kilometer for first-class. The system has been introduced also into Berlin (where it is in operation on the street railways); into Turkey, Servia, Bulgaria, and in Cork, Ireland on the Blackrock and Passage railway.

ZONURIDÆ, *zō-nū'rĭ-dē:* family of saurian reptiles, having the head covered with regular polygonal shields; body and tail with large scales; sides furnished with a longitudinal fold of the skin, covered with small scales; tongue flat, nicked at the tip; eyes with two valvular lids. The species are numerous, natives of warm climates. The form of some is rather short and thick, others are long and serpent-like. In some also the limbs are well developed, in others they are merely rudimental, and in some the very rudiments of them are entirely concealed under the skin.

ZOOGRAPHY, n. *zō-ŏg'ră-fĭ* [Gr. *zōŏn*, an animal: *graphō*, I write]: a description of animals, with their forms and habits. ZOÖG'RAPHER, n. *-fĕr*, one who practices zoögraphy; one versed in descriptive zoology.

ZOÖGYROSCOPE, n. *zō-o-jīr'o-skōp* [from Gr. *zōŏn* and Eng. *gyroscope*]: an amplification of the zoetrope, in which a series of successive instantaneous photographs of an animal in motion are placed on a circular rotating glass, the photographs being alternately illuminated by an oxyhydrogen lantern as the glass turns, throwing a single, continuous, ever-changing picture on a screen. Although the separate photographs show the successive positions of an animal in motion, the zoögyroscope throws on the screen a vivid presentment of a moving animal.

ZOOID, n. *zō'oyd* [Gr. *zōŏn*, an animal; *eidos*, resemblance]: a small and imperfect animal; an individual of a compound or colonial animal organism.

ZOOLOG'ICAL GARDENS, or PARKS: places for the keeping and attractive display of living animals, where they may live, as far as possible, in the open air and under natural conditions; a zoological garden thus differs from a menagerie, as that term is now understood, in that in the latter the animals are confined in narrow prison-cages, under cover.

ZOÖLOG'ICAL STATIONS: places on the sea-coast at which institutions have been erected and furnished with all apparatus helpful in the study of zoology. The first establishment of this kind, due mainly to the labors of A. Dohrn, was the spacious 'Stazione Zoologica' founded at Naples 1872, opened 1874. It is of international character, and since 1880 has received a yearly endowment of about $7,500 from Germany. The Brit. Assoc. also makes a grant, and has the use of a table here. In addition to the magnificent spaces below stocked with various kinds of sea-inhabitants, it has rooms above for accommodation of fifty students. provided with every desirable apparatus. Institutions similar, but on a much smaller scale, have since been set up at Triest (1875), at Roscoff (Brittany), at Wimereux, near Boulogne, at Concarneau (Brittany) and Marseilles, at Archangel, and in the United States at Newport, R. I. In 1884 a well-equipped marine station was opened at Granton, near Edinburgh; and the Marine Biological Association is promoting the establishment of a first-rate laboratory on Plymouth Sound.

ZOOKS, int. *zûks* [contracted from *by God's looks*]: an old form of oath.

ZOÖL'ATRY: the worship of animals. This seems to have passed through three stages: (1) The animal was reverenced and propitiated as possessing a power greater than that of man. (2) The animal was regarded as an incarnation of some deity or spirit. (3) It was raised to the position of a tribal ancestor. In the early history of the human race zoölatry of some kind was very prevalent. Traces of it appear in the Bible, as in the story of the Golden Calf made by the Israelites (Ex. xxxii.). Zoölatry took deep root in the religious life of the ancient Egyptians, and all three forms flourished among that people. Juvenal opens his 15th satire with a scathing invective of Egyptian zoölatry, and detailed accounts of it occur in Herodotus, Plutarch, Strabo, and Cicero. In classic times the chief form of zoölatry was serpent worship, though traces of other forms occur in the transformation myths of the poets. In the present day zoölatry survives chiefly in India and among the snake-worshippers of the w. coast of Africa. See NATURE WORSHIP.

ZOOLITE, n. *zō'ŏl-īt* [Gr. *zōŏn*, an animal; *lithos*, a stone]: a petrified or fossil animal. ZOÖLITHIC, a. *zō-ŏ-lĭth'ĭk*, of or pertaining to a zoölite.

1. Rhinoceros Iguana.
2. Gila Monster.

ZOÖLOGY, n. *zō-ŏl'ŏ-jĭ* [Gr. *zōŏn*, an animal; *logos*, a discourse]: that branch of natural history which treats of the structure, habits, classification, etc., of all animals. ZOÖLOGICAL, a. *zō'ō-lŏj'ĭ-kăl*, of or pertaining to zoölogy. ZO'ÖLOG'ICALLY, ad. *-lĭ*. ZOÖL'OGIST, n. *-jĭst*, one versed in the natural history of animals.

ZOÖL'OGY: that branch of natural history which has for its subject the Animal (q.v.) Kingdom. It is itself divided into a number of branches, which are often pursued as distinct sciences, the subject being too large to be thoroughly studied except in this manner; though it is necessary that the results of investigation in particular departments should be brought together, so that the animal kingdom may be viewed as a whole, and the relations of the most widely different groups of animals to each other determined. The branches of Z. relating to the inferior classes of *Vertebrata* are thus named: that which has *Birds* for its subject is universally known as *Ornithology* (q.v.); that which relates to *Reptiles* is *Herpetology* (q.v.), and the subordinate branch relating to serpents is sometimes called *Ophiology;* that which relates to *Fishes* is *Ichthyology* (q.v.). Among *Invertebrate Animals*, the great group of *Mollusca* is the subject of the science of *Malacology* (q.v.), though this term is seldom used; and when shells rather than the animals which bear them are considered, the term *Conchology* (q.v.) is employed. No particular term is commonly applied to the branches of Z. which treat of the *Crustacea*, *Arachnida*, etc.; but that which relates to *Insects* is universally known as *Entomology* (q.v.), and *Helminthology* (q.v.) has *Worms* for its subject. No similar terms are used for the branches of this science which relate to other groups of *Invertebrata*.

The science of Z., however, divides itself into distinct sciences, not so much in accordance with the divisions of the animal kingdom, as with regard to particular aspects of the subject which may be studied either in relation to animals generally or to any particular species. Thus, *Anatomy* (q.v.) may be regarded as a branch of Z., when the term Z. is taken in its largest sense, as including man as well as the inferior animals; and *Ethnology* (q.v.) must in like manner be considered as belonging to it. The anatomy of the inferior animals is sometimes called *Zoötomy*, and the term *Comparative Anatomy* is employed when their structure is studied in relation to that of man, and the structure of one division of the animal kingdom in relation to that of the others. *Physiology* (q.v.) is one of the most important branches of Z.; and with it that branch of chemistry which treats of animal substances is closely connected. A very interesting branch of Z. is that which relates to the habits and instincts of animals. It can hardly be said to have been constituted into a separate science, but has received much attention from those naturalists who have devoted themselves to the study of particular groups of animals. See ANIMAL.

We have no evidence that the study of Z. was prosecuted to any considerable extent before the time of Aristotle

In his hands it became at once a science, and the foundations of a system of classification were laid. No artificial system of classification has ever been proposed in Z., like the sexual system of Linnæus in botany; but from the very first to the present day, a natural grouping of animals has always been attempted. To this the widely marked distinctions between the principal groups almost unavoidably led. Aristotle brought to bear on the subject the highest powers both of observation and of generalization, and some of the groups established by him retain their place in the most modern systems. Ælian and Pliny show no capacity for the scientific treatment of the subject; and in their writings facts are largely mingled with fables. During the middle ages, Z., like kindred sciences, was neglected. for many centuries the only name worth mentioning in connection with the history of the science is that of Albertus Magnus; whose knowledge, however, was entirely derived from Aristotle and other ancient authors. From his time, in the first half of the 13th c., to the beginning of the 16th, Z. was again almost completely neglected; but the new activity of mind which then displayed itself soon sought this as well as other directions, and an especial impulse was given to Z. by the progress of geographical discovery. The names of Belon (q.v.) and Rondelet (q.v.) are the two greatest in this department at this period, and by them Z. was enriched with many new facts, while attempts were made at a more perfect classification. Aldrovandi (q.v.) and Gesner (q.v.) soon followed, besides others who began to direct their attention more specially to particular branches of Z.; but it was not till after the middle of the 17th c. that any real progress was made in classification founded on a philosophical study and comparison of animals. The works of Ray (q.v.) are described by Cuvier as 'the foundation of modern zoölogy.' The materials, however, were in great part prepared, and the first outline of a system sketched, by Willughby. From the days of Aristotle, Z. had never been prosecuted with such acuteness of observation, accuracy of description, and breadth of philosophical generalization as it was by Willughby and Ray. The progress of the science now became very rapid Buffon won for it, by his interesting descriptions and brilliant style, the general attention of the educated portion of society in his own and in other countries. He was almost immediately followed by Linnæus, who, extending his studies from botany to Z., not only enlarged the science by his own observations and discoveries, but rendered it far greater service by gathering together the facts ascertained by others, and by the improvement which he effected in classification. Some of the larger groups established by Linnæus have been retained by all subsequent naturalists without essential modification of their characters, and even his smallest groups—genera—have been very generally retained, though now regarded as constituting tribes or families. According to the Linnæan system, the animal kingdom is divided into six great classes, further brought together in groups of two each, as follows:

Heart bilocular, with two auricles, blood warm, red,	Viviparous.	1. Mammalia.
	Oviparous.	2. Birds.
Heart unilocular, with one auricle, blood cold red,	With lungs	3. Amphibia.
	With gills.	4. Fishes.
Heart unilocular, with one auricle, circulating fluid (*sanies*) cold, white,	With antennæ.	5. Insects.
	With tentacula.	6. Vermes.

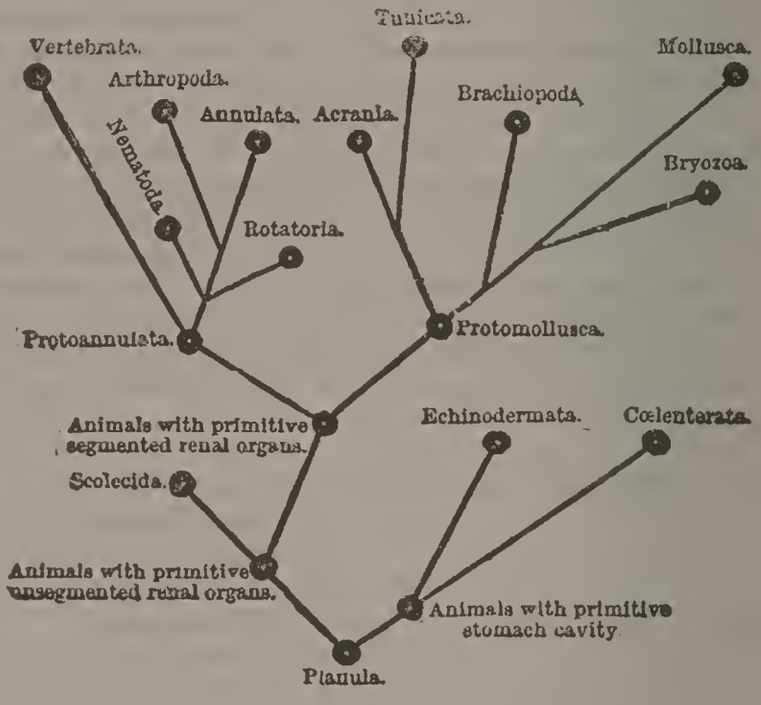
It was, however, in constituting and defining the genera that Linnæus showed in the highest degree his powers both of observation and of arrangement. His labors in the lower departments of the animal kingdom were much less perfect than in the higher; but others speedily entered on the field, and while new species of animals and their habits continued to be described, the study of comparative anatomy also was diligently prosecuted. The names of Pallas, Hunter, and Blumenbach particularly are worthy of notice; but more than any other the name of Cuvier, who, like Linnæus, took a comprehensive view of the whole subject of Z., and carried forward the work of minute observation as well as of generalization. His system of classification is so vast an improvement on that of Linnæus as to be almost fundamentally new, and has formed a new starting-point for all further progress. For the divisions, the classes, and many of the orders of Cuvier's system, see their respective titles; it suffices here to give a general outline of the system.

Div. I. Vertebrata.	Class 1.	Mammalia.
	" 2.	Aves (Birds).
	" 3.	Reptilia (Reptiles).
	" 4.	Pisces (Fishes).
Div. II. Mollusca.	Class 1.	Cephalopoda.
	" 2.	Pteropoda.
	" 3.	Gasteropoda.
	" 4.	Acephala.
	" 5.	Brachiopoda.
	" 6.	Cirrhopoda.
Div. III. Articulata.	Class 1.	Insecta (Insects).
	" 2.	Crustacea.
	" 3.	Arachnida.
	" 4.	Annelida.
Div. IV. Radiata.	Class 1.	Echinodermata.
	" 2.	Entozoa.
	" 3.	Acalephæ.
	" 4.	Polypi.
	" 5.	Infusoria.

The system of Cuvier has been extensively modified by many subsequent anatomists; notably Lamarck, De Blainville, Ehrenberg, Owen, Milne-Edwards, Von Siebold and Stannius, Leuckart, Agassiz, Huxley, Haeckel, and others. The accompanying outline, while serving to give an idea of the present state of classification, must not be regarded as authoritative or final, since the rapid progress of knowledge is introducing incessant change in our conceptions of the relations of the greater groups. The reverse error

must, however, be guarded against—that of supposing one classification as good as another, for each really marks a stage of progress. The taxonomy of the various groups, too, has reached a considerably greater degree of permanence.

The most remarkable waves of progress in Z. since Cuvier have been due at first to the splendid morphological impulse of Geoffrey St. Hilaire (q.v.); to the prosecution, in the light of the cell-theory, of the study of the simplest forms of life and of the minute structure of the



higher animals; to the pursuit of embryology under Von Baer (q.v.) and his successors; and, finally, in the highest degree to Darwin's labors, in the regions both of observation and of theory. Influenced by the theory of evolution (see DARWINIAN THEORY: DESCENT OF MAN: SPECIES, ORIGIN OF: GEOGRAPHICAL DISTRIBUTION: ETC.), and aided by embryology, the zoölogist now seeks to arrange his forms in series which should represent not merely resemblance of adult structure, but also should indicate as nearly as possible the hypothetical lines of descent by which he believes these forms to have originated. Thus various recent authors, notably Haeckel and Semper, have constructed 'phylogenetic' classifications of the animal kingdom in the form of genealogical trees; but these speculations, however ingenious and suggestive, cannot supersede the existing classifications, at least while our knowledge of embryology, and especially of paleontology, remains so imperfect; for the line of descent has been made out with probability only in the case of a few genera, such as the horse (see MAMMALIA) and crocodile. It may be interesting, however, to preface the in general Huxleyan classification by the above example of a genealogical tree, borrowed from Semper.

ZOÖLOGY.

I. PROTOZOA.

Section A. MONERA.—Class 1. Monera.
Section B. ENDOPLASTICA.—Class 2. Rhizopoda; 3. Foraminifera; 4. Heliozoa; 5. Radiolaria; 6. Infusoria; 7. Gregarinida.

II. PORIFERA.

Class 1. Myxospongiæ; 2. Fibrospongiæ; 3. Calcispongiæ.

III. CŒLENTERATA.

Class I. HYDROZOA—
- Sub-class i. Hydroida.—Order 1. Hydridæ; 2. Corynidæ; 3. Sertularidæ; 4. Campanularidæ.
- Sub-class ii. Siphonophora.—Order 5. Calycophoridæ; 6. Physophoridæ.
- Sub-class iii. Discophora.—Order 7. Medusidæ; 8. Lucernaridæ.
- Sub-class iv. Graptolitida (extinct).—Order 9. Graptolitidæ.

Class II. ACTINOZOA—
- Sub-class i. Coralligena.—Order 1. Zoantharia, (*a*) Malacodermata, (*b*) Sclerodermata, (*c*) Sclerobasica; 2. Alcyonaria; 3. Rugosa (extinct).
- Sub-class ii. Ctenophora.—Order 4. Ctenophora.

IV. VERMES.

Class I. PLATYELMIA.—Order 1. Turbellaria; 2. Nemertea; 3. Trematoda; 4. Cestoidea.
Class II. NEMATELMIA.—Order 1. Nematoda; 2. Gordiacea.
Class III. ACANTHOCEPHALA (*Echinorhynchus*).
Class IV. CHÆTOGNATHA (*Sagitta*).
Class V. ROTATORIA.
Class VI. ENTEREPNEUSTA (*Balanoglossus*).
Class VII. GEPHYREA.
Class VIII. ANNELIDA—
- Sub-class i. Discophora.
- Sub-class ii. Chœtopoda.—Order 1. Achœta; 2. Oligochœta; 3. Polychœta (Tubicola, Errantia).

Class IX. POLYZOA.
Class X. BRACHIOPODA.

V. ARTHROPODA.

Class I. PROTOTRACHEATA (*Peripatus*).
Class II. MYRIAPODA.—Order 1. Chilognatha; 2. Chilopoda.
Class III. INSECTA—
- Section A. Ametabola.—Order 1. Anoplura; 2. Mallophaga; 3. Thysanura.
- Section B. Hemimetabola.—Order 4. Neuroptera; 5. Hemiptera; 6. Orthoptera.
- Section C. Holometabola.—Order 7. Aphaniptera; 8. Diptera; 9. Hymenoptera; 10. Lepidoptera; 11. Strepsiptera; 12. Coleoptera.

Class IV. CRUSTACEA.—Order 1. Trilobita (extinct); 2. Phyllopoda. (*a*) Branchiopoda, (*b*) Cladocera; 3. Cumacea; 4. Edriophthalmia, (*a*) Amphipoda, (*b*) Isopoda; 5. Stomatopoda; 6. Copepoda; 7. Ostracoda; 8. Cirripedia; 9. Schizopoda; 10. Decapoda, (*a*) Macrura, (*b*) Brachyura.
Class V. ARACHNIDA.—Order 1. Merostomata, (*a*) Xiphosura, (*b*) Eurypterida (extinct); 2. Arthrogastra; 3. Araneina; 4. Acarina; 5. Linguatulina.

VI. ECHINODERMATA.

Class 1. Echinoidea; 2. Asteroidea; 3. Ophiuroidea; 4. Crinoidea; 5. Holothuroidea; 6. Blastoidea (extinct); 7. Cystoidea (extinct).

VII. MOLLUSCA.

Class I. LAMELLIBRANCHIATA—
- Section A. Dimya.—Order 1. Asiphonida; 2. Siphonida.
- Section B. Monomya.

Class II. POLYPLACOPHORA
Class III. SCAPHOPODA.
Class IV. GASTEROPODA—
- Section A. Prosobranchiata.
- Section B. Opisthobranchiata.
- Section C. Pulmonata.
- Section D. Heteropoda.

Class V. PTEROPODA—
Order 1. Thecosomata; 2. Gymnosomata.
Class VI. CEPHALOPODA—
Section A. Tetrabranchiata.
Section B. Dibranchiata.—Order 1. Decapoda; 2. Octopoda.

VIII. TUNICATA.

Class I. PERENNICHORDATA (*Appendicularia*).
Class II. CADUCICHORDATA—
Section A. Simplicia.
Section B. Composita.
Section C. Conserta.

IX. VERTEBRATA.

α ACRANIATA (*Amphioxus*).
β CRANIATA.
Class I. ICHTHYOPSIDA—
Section A. Cyclostomata.
Section B. Pisces.—Order 1. Elasmobranchii; 2. Holocephala; 3. Ganoidei; 4. Teleostei, (*a*) Physostomi, (*b*) Anacanthini, (*c*) Acanthopteri, (*d*) Pharyngognathi, (*e*) Lophobranchii, (*f*) Plectognathi; 5. Dipnoi.
Section C. Amphibia.—Order 1. Urodela; 2. Anura; 3. Gymnophiona; 4. Labyrinthodonta (extinct).
Class II. SAUROPSIDA—
Section D. Reptilia.—Order 1. Lacertilia; 2. Chelonia; 3. Ophidia; 4. Crocodilia; 5. Plesiosauria; 6. Ichthyosauria; 7. Dinosauria; 8. Pterosauria (the last five extinct).
Section E. Aves—
i. Saururæ (*Archæopteryx*).
ii. Ratitæ (*Cursores*).
iii. Carinatæ.—Order 1. Natatores; 2. Grallatores; 3. Rasores, (*a*) Gallinacei, (*b*) Columbacei; 4. Scansores; 5. Insessores or Passeres, (*a*) Dentirostres, (*b*) Conirostres, (*c*) Tenuirostres, (*d*) Fissirostres; 6. Raptores.
Class III. MAMMALIA—
Section i. Ornithodelphia.—Order 1. Monotremata.
Section ii. Didelphia.—Order 2. Marsupialia.
Section iii. Monodelphia (or Placentalia).—Order 3. Edentata; 4. Ungulata, (*a*) Perissodactyla, (*b*) Artiodactyla; 5. Sirenia; 6. Toxodontia (extinct); 7. Dinocerata (extinct); 8. Tillodontia (extinct); 9. Hyracoidea; 10. Proboscidea; 11. Carnivora; 12. Cetacea; 13. Insectivora; 14. Rodentia; 15. Cheiroptera; 16. Primates, (*a*) Lemuridæ, (*b*) Simiadæ, (*c*) Anthropidæ.

An example of the most recent genealogical classification is the following by Ray Lankester, omitting here the orders except among the higher vertebrates, and with a diagram representing the genealogical tree according to his system. The diagram on next page, together with the fact that Lankester gives large place to Dohrn's doctrine of the degeneration of forms, as well as to the branching out of phyla from an original stock, will serve to explain why in this system the higher groups occupy a central place, and the usual order is changed in other respects also. Of course all such arrangements are very hypothetical.

Grade A. PLASTIDOZOA (PROTOZOA).

Grade *a*. GYMNOMYXA—
Class I. Proteomorpha (no orders recognized).
Class II. Mycetozoa.
Class III. Lobosa.
Class IV. Labyrinthulidea (no orders).
Class V. Heliozoa.
Class VI. Reticularia.—Sub-class *a*. Imperforata; *b*. Perforata
Class VII. Radiolaria.—Sub-class *a*. Silicoskeleta; *b* Acanthinoskeleta.

Grade *b*. CORTICATA.—
Class I. Sporozoa.—Sub-class *a*. Gregarinidea; *b*. Coccidiidea: *c*. Myxosporidea (no orders); *d*. Sarcocystidea (no orders).
Class II. Flagellata.—Sub-class *a*. Lissoflagellata; *b*. Choano flagellata.
Class III. Dinoflagellata.
Class IV. Rhynchoflagellata (no orders).
Class V. Ciliata.
Class VI. Acinetaria.

Genealogical Tree of Animal Kingdom.

Grade B. ENTEROZOA

Sub-grade A. CŒLENTERA.

Phylum 1. NEMATOPHORA

Class I. Hydromedusæ.
Class II Scyphomedusæ.—Sub-class *a*. Tetrameralia; *b*. Octo meralia.
Class III. Anthozoa.—Sub-class *a*. Actiniomorpha; *b*. Alcyo niomorpha.
Class IV. Ctenophora.

Phylum 2. PORIFERA.

Class I. Calcispongiæ (= *Megamastictora*).
Class II. Silicospongiæ (= *Micromastictora*).—Sub-class 1. Hyalo spongiæ; 2. Demospongiæ.

Sub-grade B. CŒLOMATA.

Phylum 1. VERTEBRATA.

Branch A. HEMICHORDA (*Balanoglossus*).
Branch B. UROCHORDA—
Grade I. Larvalia (no divisions recognized).
Grade II. Saccata.
Class I. Ascidiæ.
Class II. Salpiformia.

Branch C. CEPHALOCHORDA (*Amphioxus*).
Branch D. CRANIATA—
Grade I. Cyclostoma.
Class I. Myxinoidea (no orders).
Class II Petromyzontia (no orders).
Grade II. Gnathostoma.
Sub-grade *a* Branchiata Heterodactyla.
Class I. Pisces.—Sub-class 1. Selachii; 2. Holocephali (no orders); 3. Ganoidei; 4. Teleostei.
Class II. Dipnoi.
Sub-grade *b*. Branchiata Pentadactyla.
Class I. Amphibia.—Sub-class 1. Urodela; 2. Gymnophiona (*Cœcilia*, etc.); 3. Stegocephala (*Labyrinthodon*, etc.); 4. Anura (*Rana*, etc.).
Sub-grade *c*. Lipobranchia Pentadactyla.
Branch *a*. Monocondyla.
Class I. Reptilia.—Sub-class 1. Chelonia (orders not tabulated); 2. Lacertilia; 3. Ophidia; 4. Crocodilia; 5. Plexosauria (orders not tabulated); 6. Dinosauria; 7. Anomodontia (*Dicynodon*, etc.); 8. Plesiosauria; 9. Ichthyosauria.
Class II. Aves.—Grade *a*. Phanerodactyla; *b*. Cryptodactyla.
Branch *b*. Amphicondyla.
Class. Mammalia.
Grade 1. Monotrema (*Ornithorhynchus* and *Echidna*).
Grade 2. Ditrema.
Branch *a*. Marsupialia.
Branch *b*. Placentalia.—Sub-branch *a*. Typidentata: Orders. 1. Proïnsectivora; 2. Insectivora; 3. Carnivora; 4. Cetacea; 5 Ungulata; 6. Amblypoda; 7. Sirenia; 8. Toxodontia; 9. Rodentia; 10. Proboscidea; 11. Hyracoidea; 12. Cheiroptera; 13. Prosimiæ; 14. Simiæ. Sub-branch *b*. Edentata.

Phylum 2. ECHINODREMA.

Branch A. AMBULACRATA—
Class I. Holothuridea.
Class II Echinoidea.—Grade *a*. Palæechini (*Melonites*, *Eocidaris*); *b*. Autechini: Branch 1. Desmosticha; 2. Petalosticha.
Class III. Asteroidea.
Class IV. Ophiuroidea.
Branch B. TENTACULATA—
Class I Crinoidea.
Class II. Cystoidea.
Class III. Blastoidea.

Phylum 3. PODAXONIA.

Class I. Gephyræa.—Sub-class 1. Echiuromorpha; 2. Sipunculomorpha.
Class II. Polyzoa.—Sub-class 1. Vermiformia; 2. Eupolyzoa Branch *a*. Ectoprocta; *b*. Entoprocta (*Loxosoma*, etc.).
Class III. Brachiopoda.

Phylum 4. NEMATOIDEA.

Class I. Enmematoidea (no orders).
Class II. Chætosomaria (*Chætosoma*, *Rhabdogaster*).
Class III. Chætognatha (*Sagitta*, *Spadella*).

Phylum 5. ACANTHOCEPHALA.

Phylum 6. GASTROTRICHA.

Phylum 7. PLATYHELMIA.

Branch A. CILIATA—
Class I. Rhandocœla.
Class II. Dendrocœla.
Class III Nemertina
[The *Mesozoa* of Van Beneden may be classed here as a degenerate parasitic group including *Orthonectida* and *Rhombozoa*.]

Branch B. Cotylophora
Class I. Trematoidea.—Sub class *a*. Monogenea; *b*. Digenea
Class II. Cestoidea.
Class III. Hirudinea.

Phylum 8. Appendiculata.

Branch A. Rotifera—
Class I. Parapodiata.
Class II. Lipopoda.
Branch B. Chætopoda—
Class I. Polychæta.—Sub-class 1. Errantia (orders not tabulated); 2. Sedentaria (orders not tabulated).
Class II. Oligochæta.
Class III. Myzostomaria.
Class IV. Saccocirridea.
Class V. Haploannelida.
Branch C. Arthropoda (= *Gnathopoda*)—
Grade 1. Ceratophora.
Class I. Paripatidea.
Class II. Myriapoda.
Class III. Hexapoda.
Grade 2. Acerata.
Class I. Crustacea.—Grade 1. Entomostraca; 2. Lepostraca; 3. Malacostraca: Branch *a*. Arthrostraca; *b*. Thoracostraca.
Class II. Arachnida.—Grade *a*. Delobranchia; *b*. Embolobranchia; *c*. Lipobranchia.
Class III. Pantopoda.
Class IV. Tardigrada.
Class V. Linguatulina

Phylum 9. Mollusca.

Branch A. Glossophora—
Class I. Gastropoda.—Grade 1. Isopleura; 2. Anisopleura: Branch *a*. Streptoneura; *b*. Euthyneura.
Class II Scaphopoda.
Class III. Cephalopoda (= *Siphonopoda*).
Branch B. Lipocephala—
Class Lamellibranchia.

Authorities.—General Morphology and Classification—Linnæus, *Systema Naturæ;* Cuvier, *Règne Animal;* Lamarck, *Histoire des Anim. s. Vertèbres;* Owen, *Comp. Anat. of Vertebrates;* Bronn's *Klassen u. Ordnung d. Thierreichs;* Huxley, *Anat. of Vertebrated Animals* (1871), and *Anat. of Invertebrated Animals* (1875); Claus, *Lehrb. d. Zoologie* (1882); Gegenbaur, *Introd. to Comp Anat.* (1875); Balfour's *Embryology* (1881). Physiology — Milne-Edwards. *Leçons s. la Physiologie.* Distribution—Wallace, *On Distribution of Animals* (2 vols. 1876). Ætiology —Darwin's *Origin of Species*, and other works. For bibliography of special subjects, see works of Bronn, Claus, Huxley, and Gegenbaur, above cited.

See also Animal Kingdom: Vertebrata: Mammalia: Birds: Fishes: Reptiles: and the titles of the several animals.

ZOÖN, n. *zō'ŏn* [Gr. *zōŏn*, an animal]: in *biol.*, the product of a fertilized ovum.

ZOÖNOMY, n. *zō-ŏn'ō-mĭ* [Gr. *zōŏn*, an animal; *nomos*, law]: the science which treats of the laws of organic life in animals; animal physiology.

ZOÖPHAGOUS, a. *zō-ŏf′ă-gŭs* [Gr. *zōŏn*, an animal; *phagein*, to eat]: feeding or preying on other animals. ZOÖPH′AGAN, n. *-găn*, an animal that feeds on animal food.

ZOÖPHILOUS, a. *zō-ŏf′il-ŭs* [Gr. *zōŏn*, an animal; *philĕō*, I love]: in *bot.*, fertilized by the agency of insects or other animals.

ZOÖPHYTE, n. *zō′ō-fīt* [Gr *zōŏn*, an animal; *phuton*, a plant]: a compound animal whose colonies resemble a vegetable; a colony of polyps; one of the *Zoöphyta*, a term employed by Cuvier, in his earlier attempts at classification, in the same sense as he afterward employed *Radiata*—the lowest primary division of the animal kingdom, which includes many animal organisms that are fixed to a definite spot of rock, shell, etc., and have more or less superficial resemblance to plants—e.g., corals, sea-anemones, etc.: see ZOÖLOGY. The term is now disused by scientific naturalists. ZO ÖPHYT IC, a. *-fĭt′ĭk*, or ZO′ÖPHYT′ICAL, a. *-ĭ-kăl*, pert. to or composed of zoöphytes. ZOÖPHYTOLOGY, a. *zō′ō-fī-tŏl′ō-jĭ* [*zoöphyte*, and Gr. *logos*, a discourse]: the department of natural history which treats of the structure, mode of growth, etc., of sponges, corals, etc.

ZOÖSPERM, n. *zō′ō-spĕrm* [Gr. *zōŏn*, an animal; *sperma*, seed]: in *bot.*, one of the locomotive spores of some algæ and fungi; a zoöspore; an antherozoid; in *zool.*, a male seed-cell; a spermatozoön.

ZOÖSPORE, n. *zō′ō-spōr* [Gr. *zōŏn*, an animal; *spora*, seed]: one of the active spores of certain algæ or seaweeds, which are endowed with motion; a zoösperm. *Zoöspore* is the name given in botany to those Spores (q.v.) of many lower algæ and fungi which, being furnished with cilia, move spontaneously for a short time after being discharged from the spore-case of the parent plant. The motions of their cilia resemble those of the cilia on the Epithelium (q.v.) of the higher animals. The purpose served by the

Portion of Thallus of a Green Seaweed (*Ulva*):
a free zoöspores, each with four cilia; *b*, young zoöspores forming from protoplasm of cell; *c*, opening in cell-wall by which zoöspores have escaped.

ciliary motion in zoöspores is evidently the wider diffusion of the species; and the cessation of the motion after a certain time permits the spore to become fixed, in order to germination, which is frequently preceded by conjugation. They are apt to be mistaken by observers with the microscope for Infusoria (q.v.).

ZOÖTHECA, n. *zō'ō-thē'ka* [Gr. *zōŏn,* an animal; *thēkē,* a case]: in *bot.,* a cell containing a spermatozoid.

ZOÖTOMY, n. *zō-ŏt'ō-mĭ* [Gr. *zōŏn,* an animal; *tomē,* a cutting]: the branch of anatomical science which relates to the structure of animals; the dissection or anatomy of animals. ZOÖTOMICAL, a. *zō'ō-tŏm'ĭ-kal,* pertaining to zoötomy. ZOÖTOMIST, n. *zō-ŏt'ō-mĭst,* one who dissects the bodies of animals; one versed in zoötomy.

ZOO-ZOO, n. *zô'zô* [onomatopoetic]: wood-pigeon (*prov. Eng.*)

ZOPISSA, n. *zŏ-pĭs'sa* [L.—from Gr. *zopissa*]: in *pathol.,* a mixture of pitch and tar impregnated with salt water, scraped from the hulls of ships. It was formerly used as an external application, being believed to be resolutive and dessicative.

ZORGITE: a mineral from Zorge and Tilkerode in the Harz. Massive; brittle; hardness, 2.5; specific gravity, 7 to 7.5; lustre, metallic; color, lead or sometimes yellowish gray. A selenide of lead and copper in varying amounts.

ZORIL, or ZORILLE, n. *zŏr'ĭl* [Sp. *zorillo,* whelp of a fox—from *zorro,* a male fox]: a small skunk-like animal of Africa and Central America.

ZORILLA, MANUEL RUIZ: Spanish statesman: b. Burgo de Osma, province of Soria, 1834; d. Burgos, 1895. He studied law at Valladolid and became an advocate at Madrid, where in 1856 he was chosen to the Cortes, in which he identified himself with the Progressive party, and displayed a vigorous hostility against the Neo-Catholics. Banished in consequence of the insurrection of June 1866, he remained in France until the revolution of 1868, when Serrano appointed him minister of commerce, education, and public works. In 1869-70 he was minister of justice, and later pres. of the Cortes. He was a supporter of Duke Amadeus of Aosta for the Spanish throne; and when the latter became Amadeus I., was made minister of religious affairs. In 1872 he assumed the head of a radical ministry, but after Amadeus' abdication retired. On account of participation in the military revolt of 1884, Mar., he was sentenced to death. He finally returned unharmed to Spain.

ZORN, ANDERS LEONARD: Swedish painter: b. Utmedal 1860, Feb. 18. He studied sculpture and painting at the Stockholm Academy. In 1882 he settled in London, where he attained special success as a portrait painter; and in 1889 went to Paris. He traveled widely in Sweden, Italy, Spain, England, the United States, and elsewhere; while in the United States he painted several portraits. His work includes landscape, genre, and portrait painting, as well as etchings of great merit. Among his paintings are *Irish Maidens; The Toast;*

Italian Street Scene; Summer in Sweden; and portraits of Renan and of King Oscar; his etchings are mostly copies of his own paintings.

ZORN, PHILLIP: German jurist: b. Baireuth 1850, Jan. 13. After study at Munich and Leipsic, he became a lecturer at Munich in 1875, and in that year went as professor to Bern. From 1877 he was at Königsberg, and in 1900 took a chair in the legal faculty at Bonn. In 1899 he participated as an expert in the Peace Conference at The Hague. Among his works are: *Staat und Kirche in Norwegen bis zum Ende des 13ten jahrunderts* (1875); *Staat und Kirche in der Schweiz* (with Gareis 1877-8); *Staatsrecht des Deutschen Reichs* (2d ed. 1894-7); *Deutsche Kolonialgesetzgebung* (1901); and *Die Deutsche Staatssprache* (1903).

ZORNDORF, *zorn'dorf,* Ger. *tsorn'dorf:* village in Prussia, 4 m. n. of Küstrin; scene of the bloodiest of the many desperate conflicts of the *Seven Years' War.* The Russians having for the second time been ordered by the Czarina Elizabeth to invade Prussia, advanced toward Berlin, committing frightful devastations, while Frederick the Great, with the bulk of his forces, was engaged with the Austrians in Silesia and Saxony. The Russians, under Fermor, were 50,000 strong, and easily drove before them Dohna's little Prussian army of 15,000; but Frederick being speedily apprised of this new invasion, hastened northward with such a reinforcement as raised the army to 30,000; and after taking care, by the breaking down of bridges, etc., to cut off their retreat, engaged the invaders. The battle, 1758, Aug. 25, from 8 A.M. till evening, consisted mainly in a succession of furious charges, accompanied with a tremendous artillery-fire, and was not decided till Seidlitz, by an able movement, turned the Russian flank. The Russians, now discovering that they were nearly surrounded, fought with the utmost desperation, and ultimately both armies bivouacked on the field of battle. In the morning, however, Fermor drew off his forces, diminished by 20,000 men, 103 cannon, and 27 standards; having inflicted on the Prussians a loss of 13,000 men, 26 cannon, and a few standards. Generals Soltikof, Czernitchef, and Prince Sulkowski were made prisoners by the Prussians on this occasion; and it is remarkable that the first named was the conqueror of Frederick II. in the next great battle between the two northern powers, at Kunersdorf.

ZOROASTER, *zō-rō-ăs'tėr,* or ZARATHUSTRA, *za-ra-thós'-tra* (which in Greek and Latin was corrupted into ZARASTRADES and ZOROASTRES; while the Persians and Parsees altered it into ZERDUSHT): founder of what is now known as the Parsee religion: whose date and place of birth are conjectural (see below). The original meaning of the name is uncertain, and though there have

been many conjectures about it, not one of them seems supported by recent investigations. Probably Zoroaster indicates only the notion of 'Chief,' 'Senior,' 'High-priest,' and was a common designation of a spiritual guide and head of a district or province. Indeed, the founder of Zoroastrianism is hardly ever mentioned without his family name—Spitama. He seems to have been born in Bactria. The terms that he applied to himself are either Manthran, i.e., a reciter of Manthras; a messenger sent by Ahuramazda; a speaker; one who listens to the voice of oracles given by the spirit of nature; one who receives sacred words from Ahuramazda through the flames. His life is completely shrouded in darkness. Both the Greek and Roman, and most of the Zend accounts about his life and works are legendary and utterly unhistorical. In the latter, he is to a great extent represented, not as a historical, but as a dogmatical personality, vested with superhuman, or rather divine powers, standing next to God, above the archangels themselves. His temptations by the devil, whose empire is threatened by him, form the subject of many traditional reports and legends. He is represented as the abyss of all wisdom and truth, and the master of the whole living creation. 'We worship'—so runs one of the prayers in the Farvardin Yasht—'the rule and the guardian angel of Zarathustra Spitama, who first thought good thoughts, who first spoke good works, who first performed good actions, who was the first priest, the first warrior, the first cultivator of soil, the first prophet, the first who was inspired, the first who was given to mankind nature, and reality, and word, and hearing of word, and wealth, and all good things created by Mazda, which embellish reality; who first caused the wheel to turn among gods and men, who first praised the purity of the living creation and destroyed idolatry, who confessed the Zarathustrian belief in Ahuramazda, the religion of the living God against the devils. . . . Through whom the whole true and revealed word was heard, which is the life and guidance of the world. . . . Through his knowledge and speech, the waters and trees become desirous of growing; through his knowledge and speech, all beings created by the Holy Spirit are uttering words of happiness.'

In the old Yazna (see ZEND-AVESTA) alone, he appears like a living reality, a man acting a great and prominent part in the history of his country and that of mankind. His father's name seems to have been Pourushâspa, and that of his daughter, the only one mentioned of his children, Pouruchista. Very obscure, however, remains, even by this account, the time when he lived. The dates generally given are as follows. Xanthos of Lydia places him about 600 years before the Trojan war, i.e., about B.C. 1750; Aristotle and Eudoxus place him 6,000 years before Plato, i.e., about B.C. 6500;

others, 5,000 years before the Trojan war, i.e., about B.C. 5500. Berosos, Babylonian historian, makes him a Babylonian king, and the founder of a dynasty which reigned in Babylon B.C. 2200—2000. The Parsees place him at the time of Hystaspes, Darius's father, whom they identify with a king mentioned in the Shâh-Nâmeh (q.v.), from whom, however, Hystaspes is totally distinct: this account would place him at about B.C. 550. Probably he must be considered to belong to an age, not later than B.C. 1000; possibly, he was a contemporary of Moses. It is almost certain that Zoroaster was one of the Soshyantôs, or fire-priests, with whom first arose the religious reform, which he boldly developed. These were probably at first identical with the Vedic Atharvans (fire-priests), as indeed Zoroastrianism is merely an advanced stage of Brahmanism. The former creed, that of Ahura, by way of eminence, transformed, after the outbreak of the schism, the good beings of the latter into devils or devas; e.g., the purely Brahmanic Indra, Sharva, Nâsatya, etc.—unless it promoted them into saints and angels (yagatas). The conflict that led to this schism between the Iranians and those Aryan tribes which immigrated into Hindustan Proper, and whose leaders became afterward founders of Brahmanism, sprang from many social, political, and religious causes. The Aryans seem to have originally led a nomad life, until some of them, reaching, in their migrations, lands fit for permanent settlements, settled down into agriculturists. Bactria and the parts between Oxus and Jaxartes seem to have attracted them most. The Iranians became gradually estranged from their brother tribes, who adhered to their ancient nomad life; and by degrees, the whilom affection having turned into hatred, they considered those peaceful settlements a fit prey for their depredations and inroads. The hatred thus nourished, by further degrees included all and everything belonging to these devastators; even their religion, originally identical with that of the settlers. The 'Deva religion' became, in their eyes, the source of all evil. Molded into a new form, styled the 'Ahura' religion, the old elements were much more changed than was the case when Judaism became Christianity. Generation after generation further added and took away, until Zarathastra, with the energy and the clear eye that belongs to exalted leaders and founders of religions, gave to that which had originally been a mere reaction and spite against the primitive 'Brahmanic' faith a new and independent life, and forever fixed its dogmas, not a few of which sprang from his own brains.

It is chiefly from the Gâthas that Zarathustra's real theology, unmutilated by later ages, can be learned (see ZEND-AVESTA). His leading idea was monotheism. Whatever may have caused the establishment of the dualism of gods, the good and the evil, in the Persian

religion—a dualism so clearly marked at the time of Isaiah the prophet that he found it necessary to protest emphatically against it—it was not Zoroaster who proclaimed it. His dualism is of a totally different nature. It was merely the principle of his speculative philosophy—a supposition of two primeval causes of the real and the intellectual world. His moral philosophy, on the other hand, moved in a triad—thought, word, and deed. There is no complete system of Zoroastrian philosophy in the Zend-Avesta, any more than there is a developed Platonic system laid down explicitly in the Platonic writings; but from what is to be gathered in the documents referred to, it cannot be doubted that Zoroaster was a deep and a great thinker, far above his contemporaries, and above even many of the most enlightened men of subsequent ages. If proof were needed for the high appreciation in which he was held in antiquity, it might be found in the fact, that even the Greeks and Romans, not given to over-rating foreign learning and wisdom, held him in highest estimation, as may be seen by their reiterated praises of the wisdom of him whose name they scarcely knew how to pronounce.

With regard, then, to the first point, his monotheism, it suffices to mention, that while the fire-priests before him, the Soshyantôs, worshiped a plurality of good spirits called Ahuras, as opposed to the Indian devas, he reduced this plurality to a unity. This one supreme being he called Ahurô Mazdaô (that Ahura which is Mazdao), or the creator of the universe—the Auramazda of the cuneiform inscriptions of the Achemenidian kings, the Ahurmazd of Sassanian times, and the Hormazd of Ormazd of modern Parsees. This supreme god is by Zoroaster conceived to be 'the creator of the earthly and spiritual life, the lord of the whole universe, at whose hands are all the creatures.' The following extract from the Gâtha (Ustavaiti) will leave no doubt on that much-contested point: 'Blessed is he, blessed are all men to whom the living wise God of his own command should grant those two everlasting powers (viz., immortality and wholesomeness). . . . I believe Thee, O God, to be the best thing of all, the source of light for the world. Everybody shall choose Thee as the source of light, Thee, Thee, holiest spirit Mazdæ! Thou createst all good things by means of the power of Thy good mind at any time, and promisest us, who believe in Thee, a long life. I believe Thee to be the powerful holy god Mazda! for Thou givest with Thy hand, filled with helps, good to the pious man, as well as to the impious, by means of the warmth of the fire strengthening the good things. From this reason, the vigor of the good mind has fallen to my lot. . . . Who was in the beginning the father and the creator of truth? Who showed to the sun and the stars their way? Who causes the moon to increase and wane, if not Thou? . . . Who is

holding the earth and the skies above it? Who made the waters and the trees of the field? Who is in the winds and in the storms that they so quickly run? Who is the creator of the good-minded beings, Thou wise? Who made the lights of good effect and the darkness? Who made the sleep of good effect and the activity? Who made morning, noon, and night?' Ahuramazda is thus to Zoroaster the light and the source of light. He is wisdom and intellect; he possesses all good things, temporal and spiritual, among them the good mind, immortality, wholesomeness, the best truth, devotion, piety, and abundance of all earthly good. All these gifts he grants to the pious man who is pure in thought, word, and deed. He rewards the good, and punishes the wicked; and all that is created, good or evil, fortune or misfortune, is his work alone.

We spoke of Zoroaster's philosophical dualism, and of its having often been confounded with theological dualism. These who deny Zoroaster's theological dualism insist that nothing was further from Zoroaster's mind than to assume more than one supreme being, one and indivisible. But that everlasting problem of all thinking minds—viz., the origin of evil, and its incompatibility with God's goodness, holiness, and justice—he attempted to solve by assuming two principles or two primeval causes, (not two gods), which, though different, were united, and produced the world of the material things as well as that of the spirit. The one who produced the *reality* (gaya) is called Vohu Mano, the good mind; the other, through whom the non-reality (ajyâiti) originated, is the Akem Manô, the naught mind. To the first belong all good, true, and perfect things; to the second, all that is delusive, bad, wicked. These two aboriginal moving causes of the universe are called twins. They are spread everywhere, in God as in men. When united in Ahuramazda, they are called Cpentô Mainyus, and Angrô Mainyus—i.e., white or holy; and dark spirit. It is asserted further that only in later writings are these two supposed to be opposed to each other, then viewed as no longer within Ahuramazda, but without—standing, in fact, in the relation of God and Devil to each other. The inscriptions of Darius know but one god, without any adversary whatsoever; but while the one side within this Divine One produced all that is bright and shining, all that is good and useful in nature, the other side produced all that is dark and apparently noxious. Both are as inseparable as day and night, and, though opposed to each other, are indispensable for the preservation of creation. The bright spirit appears in the blazing flame, the presence of the dark is marked by the wood converted into charcoal. The one has created the light of the day, the other the darkness of night; the former awakens men to their duty, the other lulls them to sleep. Life is produced by

the one, and extinguished by the other, who also, by releasing the soul from the fetters of the body, enables the soul to ascend to immortality and everlasting life.

Whether or not this view of Zoroaster's monotheism can be sustained as against the usual view which attributes dualism to him, it is certain that the original monotheism of Zoroaster did not last long. False interpretations, misunderstandings, changes, and corruptions crept in, and dualism was established in theology. The two principles then for the first time became two powers, hostile to each other, each ruling over a realm of his own, and constantly endeavoring to overthrow the other. When this doctrine, which appears fully developed first in the Vendidad, had once been accepted by some of the most influential leaders, it soon followed that, like terrestrial rulers, each of the two powers must have a council and a court of his own. The number of councilors was six, each having to rule over some special province of creation; but Ahuramazda, who at first merely presided over this council, came gradually to be included in their number; and we then read of seven instead of the usual six Ameshaspentas, or Immortal Saints. These six supreme councilors, who have found their way also into the Jewish tradition, embodied in the Talmud, are both by etymology and by the sense of the passages in which they figure distinctly seen to be but abstract nouns or ideas, representing the gifts which God grants to all those who worship with a pure heart, who speak the truth and perform good actions. The first of these angels or principles (Vohu Mano) is the vital faculty in all living beings of the good creation. He is the *son* of Ahuramazda, and penetrates the whole living good creation: by him are wrought all good deeds and words of men. The second (Ardibehesht) represents the blazing flame of fire, the light in luminaries, and brightness and splendor of any and every kind. He represents, as the light, the all-pervading, all-penetrating Ahuramazda's omnipresence: he is the preserver of the vitality of all life and all that is good; and thus represents Providence. The third presides over metals, and is the giver of wealth: his name is Sharavar, which means possession, wealth. The fourth (Issandarmat= Devotion) represents the earth: it is a symbol of the pious and obedient heart of the true Ahuramazda worshipper, who serves God with his body and soul. The two last (Khordâd and Amerdât) preside over vegetation, and produce all kinds of fruit. But apart from the celestial council stands Sraosha (Serost) the archangel, vested with very high powers; he alone seems to have been considered a personality. He stands between God and man, the great teacher of the prophet himself: he shows the way to heaven, and pronounces judgment on human action after death. He is, in the Yazna, styled the Sincere, the Beautiful, the Victorious, who protects

our territories, the True, the Master of Truth. 'For his splendor and beauty for his power and victory,' he is to be worshipped and invoked. 'He first sang the five Gâthas of Zarathustra Spitama;' that is, he is the bearer and representative of the sacred tradition, including the sacrificial rites and the prayers. He is the protector of all creation, for 'he slays the demon of Destruction, who prevents the growth of nature, and murders its life. He never slumbers, but is always awake. He guards with his drawn sword the whole world against the attacks of the demons, endowed with bodies after sunset. He has a palace of 1,000 pillars, erected on the highest summit of the mountain Alborj. It has its own light from inside, and from outside it is decorated with stars. . . . He walks teaching religion round about the world.' In men who do not honor him by prayer, the bad mind becomes powerful, and impregnates them with sin and crime, and they shall become utterly distressed both in this life and in the life to come.

In the same manner as Ahuramazda, his counterpart, Angrômainyus, was in later times endowed with a council, imitated from the one above mentioned, and consisting of six devas, or devils, headed by Angrômainyus himself, who is then styled Devânam Devo=arch-devil. The first after him is called Ako Mano, or Naught Mind, the original 'non-reality,' or evil principle of Zoroaster: he produces all bad thoughts, makes man utter bad words, and commit sin. The second place is taken by the Indian god Indra; the third, by Shiva or Shanrva; the fourth, by Naonhaitya—the collective name of the Indian Ashuras or Dioscuri; the fifth and sixth, by the two personifications of 'Darkness' and 'Poison.' There are many devas, or devils, besides found in the Zend-Avesta, mostly allegorical or symbolical names of evils of all kinds. While the heavenly council is always taking measures for promoting life, the infernal council is always endeavoring to destroy it. They endeavor to spread lies and falsehoods, and altogether with their great chief correspond with the devil and the infernal hierarchy of the New Testament.

Thus Monotheism was in later times broken up and superseded by Dualism. But a small party, represented by the Magi, remained steadfast to the old doctrine, as opposed to that of the followers of the false interpretation or Zend, the Zendiks. In order to prove their own interpretation of Zoroaster's doctrines, they had recourse to a false and ungrammatical explanation of the term Zervana Akarana, which, meaning merely time without bounds, was by them pressed into an identity with the Supreme Being; while the passages on which the present Desturs, or Parsee priests, still rest their faulty interpretation, simply indicate that God created in the boundless time, i.e., that He is from eternity, self-existing, neither born nor created. Two intellects and two

lives are further mentioned in the Zend-Avesta. By the former are to be understood the heavenly, spiritual wisdom, and the earthly wisdom, i.e., that which is learned by ordinary teaching and experience. The two lives are in the same manner distinguished as the bodily and the mental, i.e., body and soul. From these two lives, however, are to be distinguished the 'first' and 'last' lives, terms which refer to this life and the life to come. The belief in the latter, and in immortality, was one of the principal dogmas of Zoroaster, and it is held by many that it was not through Persian influence that it became a Jewish and a Christian dogma. Heaven is called the 'House of Hymns,' a place where angels praise God incessantly in song. He is also called the 'Best Life,' or Paradise. 'Hell' is called the House of Destruction. It is the abode chiefly of the priests of the bad (deva) religion. The modern Persians call the former Behesht; the latter, Duzak. Between heaven and hell there is the bridge of the gatherer or Judge, over which the soul of the pious passes unharmed, while the wicked is precipitated from it into hell. The resurrection of the body is clearly and emphatically indicated in the Zend-Avesta; and it belongs, in all probability, to Zoroaster's original doctrine—not, as has been held by some, to later times, when it was imported into his religion by other religions. A detailed description of the resurrection and last judgment is in the Bundehesh. The same argument—the almightiness of the Creator—which is now employed in a crude interpretation of the Christian doctrine of the resurrection, to show the possibility of the elements, dissolved and scattered as they may be, being all brought back again, and made once more to form the body to which they once belonged, is used in the Bundehesh to prove the Resurrection. There is still an important element to be noticed—viz., the Messiah, or Sosiosh, from whom the Jewish and Christian notions of a Messiah are held, by many, to have been derived. He is to awaken the dead bodies, to restore all life destroyed by death, and to hold the last judgment. Here, again, a later period introduced a plurality, notably a Trinity. Three great prophets are also to appear when the end of the world draws nigh, respectively bearing the names of Moon of Happy Rule, Aurora of Happy Rule, and Sosiosh, who is supposed to be the son of Zarathustra, begotten in a supernatural way; and he will bring with him a new portion of Zend-Avesta, hitherto hidden from man. Even a superficial glance at this sketch will show our readers what parallels between Jewish and Christian notions on the one hand, and the Zoroastrian on the other, are to be drawn; but, as we have noticed under PARSEE (q.v.), an attentive reading of the Zend-Avesta reveals many new and striking points of contact.

We have in the foregoing sketch mainly followed Haug, the *facile princeps* of Zend studies in these days;

but we have taken into account also the views of Windischmann, Spiegel, and other prominent investigators, and principally by quoting the words of the sacred sources themselves, when feasible, put our readers in a position to judge on the main points for themselves. We cannot, however, do better than thus briefly summarize, in conclusion, the principal doctrines of Zoroaster, as drawn from a certain speech (contained in the Gâthas), which probably, emanates from Zoroaster himself.

'1. Everywhere in the world a duality is to be perceived such as the Good and the Evil, light and darkness; this life and that life, human wisdom and divine wisdom. 2. Only this life becomes a prey of death, but not that hereafter, over which the destructive spirit has no power. 3. In the universe there are from the beginning two spirits at work, the one making life, the other destroying it. 4. Both these spirits are accompanied by intellectual powers, representing the ideas of the Platonic system on which the whole moral world rests. They cause the struggle between good and evil, and all the conflicts in the world, which end in the final victory of the good principle. 5. The principal duty of man in this life is to obey the word and commandments of God. 6. Disobedience is punished with the death of the sinner. 7. Ahuramazda created the idea of the good, but is not identical with it: this idea produced the good mind, the Divine Spirit working in man and nature, and devotion—the obedient heart. 8. The Divine Spirit cannot be resisted. 9. Those who obey the word of God will be free from all defects, and immortal. 10. God exercises his rule in the world through the works prompted by the Divine Spirit, who is working in man and nature. 11. Men should pray to God and worship him. He hears the prayers of the good. 12. All men live solely through the bounty of God. 13. The soul of the pure will hereafter enjoy everlasting life; that of the wicked will have to undergo everlasting punishment—i.e., as modern Parsee theologians explain, to the day of the resurrection. 14. All creatures are Ahuramazda's. 15. He is the reality of the good mind, word, and deed.' See PARSEE; GUEBRES; ZEND; ZEND-AVESTA; etc.

ZOROASTRIAN, a. *zō'rō-ăs'trĭ-an:* of or pertaining to Zoroaster. ZO'ROAS'TRIANISM, n.: system of Zoroaster (q.v.).

ZORRILLA Y MORAL, JOSÉ: Spanish poet: b. Valladolid 1817, Feb. 21; d. Madrid 1893, Jan. 23. He studied for the law at Toledo and Valladolid, but turned to literature. His attempts in politics showed him to be unfitted for such a career. From 1855 to 1866 he was in Mexico, latterly at the court of Maximilian. His plays, of which *Don Juan Tenorio* is probably the best, are without finish, but have continued effective through their distinctively native quality and their adaptability to

theatrical requisites. His *Leyenda de Alhamar, Granada,* and *Leyenda del Cid* were picturesque presentations of national legends in the general manner of Scott, and very popular. Zorrilla was not a careful artist, but an improvisator of great readiness and skill, both lyrical and dramatic. A bronze memorial was erected to him in Madrid in 1900. An account of him may be found in the autobiographic *Recuerdos del Tiempo Viejo* (Old-Time Memories, 1880-3). There is a three-volume collection of his works.

ZOSIMUS, *zŏs'ĭ-mŭs,* Pope of Rome: Greek by birth (pope 417, Mar. 1—418, Dec. 25); d. 418, Dec. 25. He was successor of Innocent I. He is notable as connected with the history of the heresiarch Pelagius (q.v.). The African bishops had condemned the opinions of Pelagius, and this judgment had been ratified by Pope Innocent. In the interval, however, Pelagius appealed to the pope; and his disciple, Celestius, came in person to Rome, where he presented a confession of faith in his own justification. Zosimus, having convened a council of bishops and submitted this to them, was induced by the specious explanations of Celestius to suspend the judgment, and even to write to the African bishops, recommending a reconsideration of the case. This apparent conflict of Zosimus with his predecessor, though it has been used by the Gallican as well as Protestant controversialists as an argument against papal infallibility, was nevertheless only temporary. On further examination of Celestius, Zosimus became sensible that he had been deceived; and even before the reply of the African bishops, he confirmed and renewed their original condemnation of the Pelagian doctrine. His letters, curious and interesting, are in Constant's *Epistolæ Romanorum Pontificum.*

ZOSIMUS, *zŏs'ĭ-mŭs,* of Constantinople: Greek historian in the first half of the 5th century. Of his personal history nothing is known. He wrote the History of the Roman Emperors, in six books, from Augustus to A.D. 410. The work is mainly a compilation from previous writers. His style is concise, clear, and interesting. He seeks to unfold the causes of the decline of the empire, and being himself a pagan, he adduces as the chief, the neglect of the pagan religion which attended the progress of Christianity. The unsparing severity with which he assails various Christian emperors, especially Constantine, has been considered to detract from his credibility as a historian. From his own point of view, he shows considerable acuteness in his remarks.

ZOSTER. See HERPES.

ZOSTERA, n. *zŏs'tėr-a* [Gr. *zōstēr,* a girdle—so called from the appearance of their leaves]: a genus of water or sea plants, ord. *Naiadāceæ.* See GRASSWRACK.

ZOTHECA, n. *zō-thē'ka* [Gr. *zōthēkē*]: in *anc. arch.,* a

small compartment or alcove, which might be separated from an adjoining compartment by a curtain.

ZO'JAVE: a soldier in the French army. Zouaves were originally mercenaries belonging to a Kabyle tribe. The Zouaves in the pay of the dey of Algiers were, when Algeria became a French possession, incorporated with the French army there, preserving their Arab dress. Ultimately the native element was eliminated, and the Zouaves became merely French soldiers in the picturesque Arab costume. As such they distinguished themselves in the Crimea and the Franco-Italian war of 1859. There were several regiments of zouaves among the federal troops in the American civil war.

ZOUCHE, Richard: English legal scholar: b. Anstey, Wiltshire, 1590; d. London 1661. He was educated at New College, Oxford; in 1617 was admitted an advocate of Doctors' Commons; and in 1620 became regius professor of civil law at Oxford. In addition to his university duties, he had a large practice in London. In 1641 he was made judge of the high court of admiralty. He was a royalist, though not a pronounced one, at the civil war; and although replaced in the judgeship in 1649, was nevertheless appointed by Cromwell to a special commission of oyer and terminer. He was restored to the bench in 1661. His writings include a descriptive poem, *The Dove, or Passages of Cosmography* (1613); a comedy, *The Sophister* (1639); and many works of a professional sort, most important of which are *Elementa Jurisprudentiæ* (1629); a general system of legal science, and *Juris et Judicii Fecialis Explicatio* (1650), regarded by critics as the first treatise containing a systematized arrangement of what is now known as international law.

ZOUNDS, int. *zownds* [contr. of *by God's wounds*]: an old form of oath, expressive of anger or wonder.

ZOUTCH, v. *zowtch* [etym. doubt.]: to stew, as flounders, whitings, gudgeons, eels, etc., with just enough liquid to cover them.

ZRINYI, Niklas, Count: Hungarian soldier: b. 1508; d. Szigetvár 1566, Sept. 7. He distinguished himself in the siege of Vienna by Charles V., and in campaigns against John Zápolya and Sultan Suleiman. As ban of Croatia from 1542, he defended that territory against the Turks and became famous for his defense of Szigetvár (or Sziget) in 1566. His garrison of scarcely 3,000 was reduced to 600, and on Sept. 5 the enemy succeeded in firing the outer fortifications. Zrinyi retreated to the inner fortress, but this also was soon on fire. He thereupon ordered the gates to be opened, and after firing a mortar filled with broken iron into the midst of the Turks, who were urging along a narrow approach to the castle, led a sally of the garrison. He fell, mortally wounded, and the defenders were forced back; but a slow match ignited 3,000 pounds of gunpowder stored within,

and great carnage among the Turks ensued. The catastrophe has been made by Theodor Körner the subject of his *Zrinyi. Ein Trauerspeil.*

ZSCHOKKE, Johann Heinrich Daniel: German author: b. Magdeburg 1771, Mar. 22; d. Biberstein 1848, June 27. He quitted his native place in 1788, and for some time wandered about the country as play-writer to a strolling company of actors; but afterward studied at the University of Frankfort-on-the-Oder. In 1792 he commenced life there as a private teacher, and produced several pieces for the stage. He subsequently settled down in the canton of the Grisons and became director of an academy at Reichenu, where he wrote a history of the Grisons (1798). He then became head of the department of public instruction at Aarau, and was soon afterward sent by the Helvetic executive directory to Unterwalden as government commissioner, for the purpose of restoring tranquillity. He acquitted himself so satisfactorily that his powers as commissioner were extended to the cantons of Uri, Schwyz, and Zug. In 1800 he was appointed commissioner for the organization of the Italian territories of Switzerland. In 1804 he became a member of the board of mines and forests; and in the same year began the issue of his highly popular *Schweizerbote* (*Swiss Messenger*). Through the greater part of his life Zschokke appeared as one of the most distinguished and energetic public men in Switzerland, but he found time to cultivate his favorite literary pursuits, and it is chiefly by his numerous writings, historical and fictitious, that he is known to the world at large. Among his works may be mentioned: *Ueberlieferungen zur Geschichte unscrer Zeit* (1811-27) (Contributions to the History of Our Time); *Des Schweizerlandes Geschichte für das Schweizervolk* (1822) (History of Switzerland for the Swiss People), one of the best of his works; and *Bilder aus des Schweiz* (1824-6) (Pictures from Switzerland). As a writer of tales he possesses a European reputation, and among them we may refer more especially to *The Creole, Alamontade, Jonathan Frock, Clementine, Oswald or the Goldmakers' Village,* and *Master Jordan.* The work, however, which has had the most extended circulation is his *Stunden der Andacht* (Hours of Devotion) (1809-16; last ed. 1901-2), which, though rationalistic, has yet, from the pious feeling pervading it, found admirers among all classes of readers.

ZSCHOPPAU, *tschŏp'pow:* town of Saxony, circle of Zwickau; about 26 m. e. of the town of Zwickau, on the river Zschoppau. It has a castle and two churches; manufactures of hosiery, cloth, lace, etc.; weaving, wool-spinning, dye-works, bleach-fields. Pop. about 8,000.

ZUAZO, Alonso: Spanish jurist in the new world: b. Olmedo 1466; d. Santo Domingo 1527. A learned canon

of Valladolid, he was appointed jurist of the commission which, at the request of Las Casas, was sent to the new world. He was given authority to organize justice in the West Indies, and to appoint judges. For his opposition to the complete abolition of enforced labor, he was denounced by Las Casas; although in Santo Domingo he emancipated the Indians who had been held in slavery by the officials. In 1518 he was dispatched to Cuba to systematize the administration of justice in the island, and from 1525 until his death was auditor of the audiencia of Santo Domingo. Icazbalceta, in the *Colleccion de Documentos para la Historia de México* (1858-66), gives an interesting narrative, written by Zuazo from Cuba in 1521, regarding the condition of the natives there and in Santo Domingo.

ZUB'LY, John Joachim: American Independent Presbyterian clergyman: b. St. Gall, Switzerland, 1725; d. Savannah, Ga., 1781, July 23. The date of his arrival in America is unknown; but in 1760 he became the first regular pastor of the Independent Presbyterian Church in Savannah, coming thither, according to the church record from Wando Neck, S. C. In 1775, at the provincial congress of July 4, he was one of five delgates elected to represent Georgia in the continental congress, and was selected to draft a petition to the king regarding the 'unhappy situation of affairs.' In a letter of Sept. 3, 1775, to the Earl of Dartmouth, he denounced the suggestions made in England of arming the slaves to bring the southern provinces to obedience. He took part in the adjourned session of the continental congress assembled 1775, Sept. 13. When he discovered the intention of the congress to declare the independence of the United States, he revealed to Sir James Wright, royal governor of Georgia, the plans being made. One of the letters was seized, and Samuel Chase, of Maryland, referred to the fact on the floor of congress. Zubly hastily withdrew, and in Georgia openly made common cause with the Tories. In 1777 he was banished, and half of his estate seized. He remained in South Carolina until the royal government was re-established in 1779. He was an eloquent and learned preacher.

ZUCCARELLI, or Zuccherelli, Francesco: Italian painter: b. Pitigliano, Tuscany, 1702; d. Florence 1788. He studied painting at Florence and Rome, and after gaining some success in decorative landscape, worked for five years in London decorating the opera-house and executing views of the Thames. He again came to England in 1752 and became a fashionable painter, patronized by the royal family, especially the Prince of Wales, and the aristocracy. He was one of the original members of the Royal Academy in 1768. In 1773 he returned to his native country. Numerous examples of his art are in Venice, the Palazzo Reale containing 21. A large number, too, are in Windsor Castle, and he is also repre-

sented in Glasgow, Edinburgh, Paris (Louvre), St. Petersburg (Hermitage), Milan (Brera), and other cities.

ZUCCARO, or ZUCCHERO, FEDERIGO: Italian painter: b. Sant' Agnolo in Vado (Urbino) 1543; d. Ancona 1609. He was employed by Gregory XIII. to paint the vault of the Cappella Paolina in the Vatican, but having quarreled with some papal officials and painted a scurrilous picture he fled to France, and ultimately he reached England in 1574. There he painted portraits of Queen Elizabeth, the Earl of Leicester, and other distinguished persons (21 were exhibited in 1866), and afterward worked in Venice until he returned to Rome to complete his work in the Cappella Paolina. On the invitation of Philip II. he went to Madrid in 1586 to paint for the Escorial, and on his return to Rome he founded the Accademia San Luca, of which he became the first president. Many portraits of English personages in the Elizabethan era are wrongly ascribed to him, but some genuine works from his brush are extant. He was also something of an architect and sculptor.

ZUCCHI, ANTONIO PIETRO: Italian painter: b. Venice 1726; d. Rome 1795, Dec. 25. In 1754 he accompanied the English architect Robert Adam on his journeys in Italy and Dalmata, and on Adam's invitation he went to England in 1766. He decorated the interiors of several of the mansions built or altered by Adam, such as Caen Wood (Hampstead), Luton House (Bedfordshire), Osterley House (near Brentford), and Sion House (Middlesex). In 1770 he was elected an associate of the recently established Royal Academy. He married Angelica Kauffmann.

ZUCHETTO: the skull cap of a Roman Catholic ecclesiastic covering the tonsure. That of a priest is black, of a bishop or monsignor purple, of a cardinal red, and of the pope white.

ZUFFOLO, n. *zôf'fŏ-lō*, or ZUFOLO, n. *zô'fŏ-lō* [It. *zufolo*—from *zufolare*, to hiss or whistle]: a small flute or flageolet, especially one used to teach birds.

ZUG, *zôg:* smallest of the Swiss cantons; whose s.e. part borders on the Alpine region and is hilly and pastoral—the n.w. part sloping to the plain of Switzerland and inclosing a great part of the Lake of Zug; about 14 m. long by 10 wide; 92 sq.m. The s.e. part is a rich and beautiful country of corn-fields and orchards. The chief exports of Zug are dried fruit, cattle, and products of the diary. Zug is a representative democracy, all citizens above the age of 19 having the franchise. There are two councils—one legislative, of 67 members; and another, of 11 members, administrative. The inhabitants speak Swiss-German and are Roman Catholics. The battle of Morgarten, which founded the independence of Switzerland, was fought on the frontier of this canton

1315; but it was not till 1352 that Zug joined the Swiss Confederation.—Zug, capital of the canton, has a population of about 5,000. Pop. (1900) 25,093.

ZUIDER ZEE, *zī'dėr zē*, Dut. *zoy'dėr zā:* large gulf penetrating far into the Netherlands; 52° 26′—53° 20′ n. lat.; about 60 m. long, and 210 m. in circumference. The islands Texel, Vlieland, Ter Schelling, Ameland, and Schiermonnikoog, reaching in a chain from the most northern point of Holland, are the remains of the former line of coast, which form a breakwater against the North Sea. From Dunkirk in French Flanders to n. Holland, the interior is defended from the sea by sand-hills or downs. Here, as at the mouth of the Scheldt, the sand-barrier was broken, and the waters overflowing the low-lands separated the province of Friesland from the peninsula of North Holland, and, having united with the small inner lake Flevo, formed the present Zuider Zee. The decisive inundation occurred 1282.

In the Zuider Zee lie the islands Wieringen, Urk, Schokland, and Marken; population about 5,000. Fishing is the principal industry. The light-tower, on the e. point of Marken, is 52° 27′ 37″ n. lat. The inhabitants are a hardy, industrious, and independent people, who live by fishing and exporting meadow-hay. They cling tenaciously to their old customs, and marry only among themselves. The houses are built on artificial mounds, or 'hills of refuge'; and, the island being liable to frequent and heavy floods, few cows or sheep are kept, no garden or trees planted, almost all necessaries of life being brought from the mainland. From the s.e. of the Zuider Zee a long narrow arm, called the *Y* (pronounced *I*) formerly extended nearly due west, through the peninsula of Holland. A strong sea-dike and locks have been constructed to cut off the Zuider Zee from the Y; and through the Y a broad ship-canal has been made between Amsterdam and the North Sea, on which sea is a new harbor. On both sides of this new canal, the Y has been drained and turned into about 12,000 acres of rich land. The new water-way was formally opened by the king 1876. A drainage scheme inaugurated in 1892 added about 1,300,000 acres of arable land to the country.

ZULIA, Venezuela: the most northwestern state of the republic, surrounding Lake Maracaibo, bounded on the west by Colombia and on the east by Falcón. It was formerly united with Falcón, but is now politically independent. Lake Maracaibo is surrounded by low lands, but a great part of the rest of the province is mountainous. Agriculture is the chief industry; coffee, sugar, and cacao are raised. Area, 24,969 sq.m.; population 100,000.

ZULOAGA, Félix: Mexican politician, president of the republic: b. Alamos, Chihuahua, 1814; d. Mexico 1876. Having entered the national guard as a lieutenant,

he fought against the Yucatan secessionists in 1842-3, in 1843 rose to be lieutenant-colonel, and in preparation for the war with the United States directed the fortification of Monterey and Saltillo and of the southerly approaches of the capital. From 1848 to 1853 he was not in active service, but in 1853 was promoted colonel, and subsequently variously employed. On Dec. 17, 1857, he conspired against the liberal government, and finally, on Jan. 11, 1858, the brigade of which he was the commander declared Comonfort deposed and Zuloaga president. Zuloaga entered on the office Jan. 23, and the 'war of reform' began, the liberals being under the leadership of Juarez. In December the garrison deposed Zuloaga, who finally resigned, and appointed as a substitute Gen. Miramon, who assumed office Feb. 2. In 1860 Zuloaga published a manifesto proclaiming himself constitutional president, but subsequently he came to an agreement with Miramon. When the French invaded Mexico in 1862, he withdrew, but in 1864 he returned and submitted to the empire, though he took no further part in political affairs.

ZULULAND, South Africa: a country lying on the southeast coast of Africa, now a province of Natal, extending westward to the Transvaal Colony, and northward to Tongaland. Area, about 10,450 sq.m. The principal rivers are the Tugela, on the Natal boundary; the Buffalo, which joins the Tugela on the left, about midway up the Natal frontier, and forms the remaining portion of the boundary between Natal and Zululand; and the Umvolosi, which flows into St. Lucia Bay. From the coast at St. Lucia a range of mountains called the Libombo range runs northward nearly parallel to the coast, separating the country into two regions. The coast region is unhealthful. The inland region is comparatively healthful, fertile, and capable of cultivation. Rich gold reefs have been found, and excellent coal exists. The coal is being worked and a railway has been constructed to the Tugela. The country, which since 1897 has been attached to the colony of Natal, is mainly inhabited by the Zulus, who have long been distinguished as the most warlike of the Kaffir tribes. The country inhabited by the Zulus was formerly much more extensive. In the beginning of 1879 the Zulu king, Cetewayo or Ketchwayo, with a large army of fairly disciplined troops armed with rifles, came into collision with the British in South Africa. This was partly due to a long-standing dispute as to the claims of the Zulus to the Utrecht district in the southeastern angle of the Transvaal, partly to other causes, which at last induced Sir Bartle Frere, the governor-general of the British provinces in South Africa, to send an ultimatum to Cetewayo. To this no reply was sent, and war ensued. On Jan. 22 a portion of a British column was attacked at a place called Isandula or Isandhlwana, about 10 m. from Rorke's

Drift on the Buffalo, by 20,000 Zulus, and completely destroyed. As soon as possible after the news of the disaster reached England, strong reinforcements were sent out, and on July 4 following the Zulu army was totally defeated at Ulundi. On Aug. 28 Cetewayo was captured. Meanwhile Sir Garnet Wolseley had arrived with supreme military and civil authority in this part of Africa, and the Zulu territory was parceled out by him among several chieftains who were placed under the paramount supremacy of the British government, and were not to be allowed to keep up standing armies, or to import firearms or ammunition. British residents were appointed, one in North and one in South Zululand. In 1883 Cetewayo was restored to a portion of his dominions, but was opposed by some of the chiefs. After severe fighting he placed himself in the hands of the British at Ekowe or Eshowe, where he died in 1884. Subsequently the Boers of the Transvaal made themselves masters of a considerable portion of the territory and incorporated it with their own republic. In 1885 the British assumed a protectorate over the coast of the country, and in 1887 annexed all the rest. A strip between Tongaland (now a British protectorate) and Swaziland also belongs to Zululand. Pop. 201,365.

ZUMALACARREGUI, Tomas: Spanish soldier and Carlist leader: b. Ormastegui, province of Guipuzcoa, 1788; d. Segama, Navarre, 1835, June 23. He distinguished himself in the war for independence, subsequently entered the regular army, became a lieutenant-colonel in 1825, and later colonel. Ferdinand VII. made him governor of Ferrol, but Cea Bermudez, the prime-minister, removed him. Soon after the death of Ferdinand, he became the head of the Carlist bands in the Basque provinces and Navarre. With great ability he organized these troops into a really formidable force, and wielded them with remarkable success against such generals as Valdés, Quesada, and Rodil. Finally, when the constitutional army had been signally outfought, Don Carlos, against Zumalacarregui's advice, determined to attack Bilbao. Zumalacarregui's plan was to march upon Madrid by way of Vitoria and Burgos, and he regarded the siege of Bilbao as a waste of time. It was during the operations there that he received the wound from which he eventually died. He was the most able figure of the first Carlist war.

ZUMARRAGA, Juan de: Spanish prelate in America: b. Durango (Biscay) 1468; d. Mexico 1548, June 3. He was for many years guardian of the convent of Abrojo in Spain, and in December, 1527, was appointed bishop of the newly established see of Mexico. He greatly developed the Mexican missions, but directed considerable misguided zeal against Aztec manuscripts, which he gathered together all over Mexico and publicly burned.

Only comparatively few escaped this destruction. His see was elevated to an archbishopric in 1548.

ZUM'BO, South Africa: a town of Portuguese East Africa, near the confluence of the Loangwa with the Zambesi, and on the frontier line of North Rhodesia, 450 m. from the mouth of the Zambesi. It marks the western point of the Portuguese territories on the Zambesi, and was formerly the seat of an important trade, but its trade has declined greatly and the town itself has decayed. The active development of this region will probably restore its importance.

ZUMBOORUK, n. *zŭm-bo'rŭk:* in the *East,* a small swivel-gun, larger than a gingal, carried on the back of a camel, from which it is fired.

ZUMIC. See Zymic.

ZUMOLOGY. See Zymology.

ZUMPT, August Wilhelm: German classical philologist: b. Königsberg 1815, Dec. 4; d. Berlin 1877, Apr. 23. He was nephew of Karl. He was a professor in the Friedrich-Wilhelms gymnasium of Berlin from 1851. Among his publications were editions of Rutilius Namatianus (1840) and the *Monumentum Ancyranum* (1845); *Commentationes Epigraphicæ ad Antiquitates Romanas Pertinentes* (1850-4); and *Studia Romana* (1859). The larger part of the last two volumes of the German edition of Ihne's *History of Rome* is the work of Zumpt.

ZUMPT, Karl Gottlob: German philologist: b. Berlin 1792, Mar. 20; d. Karlsbad 1849, June 25. Educated at Heidelberg and Berlin, and in 1827 appointed professor at the latter, he did much effective work toward the improvement of instruction in the Latin language. Among his writings were a Latin grammar (1818; 13th ed. 1874); editions of Quintilian (1831); Curtius (1826; 1846); Cicero's orations against Verres (1831); and the *De Officiis* (1838); and several treatises, such as *Die Religion der Römer* (1845). An abbreviation of the grammar (1824) reached a 9th edition in 1866.

ZUNDERERZ, n. *zŭn'dĕr-ĕrz* [Ger.]: tinder ore; an ore of antimony occurring in soft, flexible, tinder-like masses, of a blackish-red color.

ZUNI INDIANS, *zô'nyē:* tribe of Pueblo Indians in e. Arizona and w. New Mexico. They call themselves A-shi-wi, or Shi-wi-nas, the name referring to their tribal emblem, 'the sacred water-spider.' They are the most interesting of the tribes dwelling in pueblos (piles of adobe or stone buildings), because most isolated and therefore retaining their primitive condition; and because their peculiarities were fully studied by Frank H. Cushing, who (about 1880) lived among them three years. The chief pueblo, and larger than any other now inhabited in North America, is known as Zuni; it is in a valley high upon the w. slope of the Sierra Madre, 10 m.

e. of the Arizona line, and 30 m. s. of Fort Wingate. It has about 1,500 inhabitants, and consists of a mass of apartments, 1 to 5 stories high, and built in part of red sandstone, in part of adobe made from red clay—the upper stories as usual reached by outside ladders, up which women walk erect with jars of water on their heads, and young children and even dogs easily climb. Some of the rooms are 20x40 ft., the ceilings 8 ft. high and made of beams. Meal is ground with stones in stone troughs. 'Paper bread,' so called, is dough baked by rolling out quickly on a hot slab of stone, and roasted locusts and mutton broth are favorite food. Pottery of all sorts, burned in kilns, is still a flourishing art. Monogamy prevails; and the residence apartment is owned by the wife, who, if she wills, can drive the husband away. Outside of the pueblo is a large well, with steps leading to the water; also separate family gardens in one common inclosure, where onions and herbs are cultivated. The men in summer cultivate wheat, barley, and corn in fields, sometimes 5-30 m. distant, and without irrigation; the corn is planted deep, and grows very low, the ears ripening close to the ground. Cattle, horses, sheep, and pigs are owned; eagles are reared for their feathers. There are peach-orchards, traceable probably to Spanish introduction. There are some smaller inhabited pueblos of this tribe, and extensive ruins of others. The Spaniards first visited the region 1551, and Coronado described 7 cities of 'Cibola,' which it is thought, have been now identified. The Zuni Indians have a governor of their own, administering a kind of patriarchal authority; a high-priest; and 13 wise men, 'caciques,' who make the laws. The worship is directed much to the sun and to water; also to animals, as being near to man, yet mysterious, and mediating between him and the more mysterious elements and higher powers. The most special fetiches are things in nature that have an accidental resemblance to animals, explained in a legendary way. There are two evil spirits, one malicious, the other evil through blundering ignorance. The Zuni Indians have a saga, 'perfect in rhyme and rhythm,' of four parts, each with four subdivisions, repeated at stated times, by persons trained to learn it, and occupying two evenings for the rehearsal. It treats of creation, of a world once covered with water, and of all the history of the people. It speaks of their original home as by the sea, perhaps the Pacific. In 1882 a deputation went to get some of the 'sacred water' of the Atlantic, guided by Mr. Cushing. Their language is described as high in grammatical structure, and they have also a dead language of their own, preserved by a few. Their festivals, dances, and other observances have more or less resemblance to those of other Indians. Their numbers have greatly decreased, especially by such contagious diseases as small-pox; and in some respects they differ from other

communal tribes—e.g., they are not even nominally Roman Catholic, like the Moquis in n. Arizona, though there is the ruin of a church near Zuni.

ZUNI MOUNTAINS: a detached range in Valencia co., N. Mex. The general trend is from s.e. to n.w.; length, 45 m. The mountains do not rise more than 10,000 ft. above sea-level, and this is only from 3,000 to 4,000 ft. above the surrounding plateau. The range is heavily timbered. It is of geological interest on account of its isolation and the simplicity of the stratification.

ZÚÑIGA, Alvaro Manrique de: Spanish viceroy of Mexico: b. Seville about 1530; d. Madrid about 1600. He entered Mexico in October, 1585, as viceroy, and his administration was, according to the historian, Juan de Torquemada, one of prudence and wisdom. A dispute with the audiencia of Guadalajara, however, on a point of jurisdiction, nearly precipitated civil war upon the colony. Philip II., on the basis of reports circulated by his foes, finally removed him in 1589, and directed Pedro Romano, the bishop of Tlaxcala, to investigate Zúñiga's government. Romano persecuted Zúñiga with great cruelty until 1596, when the latter sailed for Spain, where he was successful in getting revoked the sentence of confiscation pronounced against him.

ZUNIGA, Dionisio de: Central American missionary: b. Guatemala about 1550; d. Chiapa about 1620. He became a Dominican in Chiapa province, and for the greater part of his life was a missionary among the Quiche Indians. He wrote a grammar of the Quiche dialect, and prepared also in Quiche a volume of sermons and several religious treatises, besides translating Francisco Viana's works, originally written in the dialect of Vera Paz.

ZÚÑIGA Y AZEVEDO, Gaspar de, Count of Monterey: Spanish viceroy in America: b. Andalusia about 1540; d. Lima, Peru, 1606, Feb. 10. He took vice-royal charge of Mexico 1595, Nov. 5, and in 1596 sent an expedition in command of Sebastian Vizcaino (q.v.) for the exploration and occupation of Lower California. Vizcaino was hampered by lack of provisions, and returned after accomplishing little. By royal order, he was again sent out by Zúñiga in 1602, exploring the coast of Upper California. In 1597 Zúñiga drove out William Park, an English pirate who had taken possession of Campeche. Among other expeditions organized by him was one commanded by De Oñate and Zaldivar to take New Mexico. During his adminstration in Mexico he was a benefactor of the natives. In 1603 he became viceroy of Peru, though he did not enter Lima until 1604.

ZURBARAN, *thôr-bâ-rân'*, Francisco: Spanish painter: 1598, Nov.—1662. He was a pupil of Juan de Roelas, but painted in the style of Caravaggio. His most famous work is *St. Thomas Aquinas Ascending Into Heaven.*

Other works of repute by him are a series representing the life of St. Peter, executed for the Seville cathedral, and another series illustrating the life of St. Jerome, in a monastery of Guadalupe. His works were numerous, and he was appointed painter to the king 1650. He was a contemporary of the celebrated Spanish painters, Spagnoletto, Velasquez, Cano, and Murillo.

ZÜRICH, *zū'rĭk*, Ger. *tsü'rĭch:* canton on the n.e. frontier of Switzerland, ranking as the first in importance. It extends from the Lake of Zürich to the Rhine, and is of very irregular outline, being simply the lands conquered by the city of Zürich; about 656 sq.m. It is drained by the Rhine and its tributaries, and is traversed by ridges of lofty hills, running n.w. and s.e., between which lie three valleys, forming almost its whole surface —those of the Toss, the Glatt, and the Limmat. The Lake of Zürich penetrates Zürich 26 m., and connects it with the cantons of Schwyz and St. Gall. Zürich has not a fertile soil, but it is carefully cultivated. Considerable grain is raised in the canton, though not enough to supply the wants of the population. Vineyards and orchards are numerous; but the pasture-lands are of much greater importance, and cattle form the chief wealth of the agricultural population. Zürich was one of the earliest seats of the cotton manufacture in Europe, and the spinning and weaving of cotton are still prosecuted with great success. The silk manufactures are nearly as important; and recently the progress in manufacture of railway locomotives and other machinery has occasioned some disquiet to English engineers. The mechanics of Zürich divide their attention between agriculture and manufacturing industry, and are among the most prosperous and best educated working-men in Europe. The government of the canton is a representative democracy—all adult citizens of 20 enjoying the franchise. The great council of Zürich is elected chiefly by the citizens, but partly also by its own members. It appoints for four years an executive council of 9 members. A desire to give a yet more thoroughly democratic character to the constitution led to the appointment 1868 of a committee to consider its revision; and now the real decision as to laws, taxes, etc., lies with the people. Zürich returns 14 members to the national council. The population of the canton is German-speaking and mostly Protestant. Pop. (1900) 431,036.

ZU'RICH: city, capital of the canton of Zürich, and till 1848 virtually capital of the Swiss Confederation; beautifully situated on the Limmat, where it issues from the Lake of Zürich, and where it is joined by its tributary, the Sihl. It is one of the most prosperous manufacturing and commercial towns of Switzerland; yet the narrow streets and lofty houses of its older quarters, on the high ground e. of the river, give it the quaint appearance of a mediæval city. Of the many interesting old

buildings the finest and most remarkable is the Gross Münster or Propstei, erected, one part 1090-1150, the other 1225-1300. Its chapter, reorganized at the Reformation, was suppressed 1832: the fine Romanesque cloisters still remain. The next most notable church is the Frau Münster or Abtei, founded for nuns 853, whose buildings mostly are of the 13th and 14th century. The most ancient parish church is St. Peter's, 13th century. The Wasserkirche (1479-84) is a church built on an old place of pagan sacrifice, the scene of the martyrdom of early Christians: in it has been housed since 1631 the city library, 120,000 volumes, largest in Switzerland. There are extensive quays along the river and lake, several good bridges, and many institutions for charity.—Zürich is one of the intellectual centres of Switzerland, and is noted for social activity and industrial enterprise. Its schools are numerous and of high grade. The university, founded 1832-3, had (1886) 51 professors, 481 students, besides 65 special students.—The earliest inhabitants of the site of Zürich were the lake-dwellers; after them were the Celtic Helvetians, who were succeeded by the Romans. Under the Roman rule Christianity was introduced in the 3d century. The 9th century saw the development of Zürich as a Teutonic town. —Cotton-spinning and making of machinery are extensive industries, but the most important business interest is the silk trade which was largely developed as early as the 12th century, and was revived near the end of the 17th century by Huguenot and other Protestant refugees; and now employs nearly 20,000 hand-looms and about 5,000 steam-power looms—exporting annually silks to the value of more than $15,000,000, mostly to France, the United States, and England.—The Protestant Reformation early gained solid footing in Zürich through the efforts and influence of Zwingli. Pop. (1901) 152,942.

ZUTPHEN, *zŭt'fėn:* fortified town in the Netherlands, province of Gelderland; beautifully situated on the right bank of the Yssel, where that river is joined by the Berkel, in a picturesque district of country, chiefly under cultivation, and variegated with abundance of wood. It is one of the oldest towns in the kingdom, but has many elegant modern buildings. The fortifications are promenades, from many points of which lovely prospects are obtained. Zutphen is a station of the State railway from Arnhem to Friesland, and has extensive trade in wood, bark, and grain. There are factories for weaving and spinning; grain, wool, oil, and paper mills; many tanneries, a soap-boiling establishment, and a large carpet manufactory. The principal building is the Great Church, supposed to have been founded 1103; it and the Broederenkerk (Church of the Brethren) belong to the Reformed communion; the Roman Catholics, Lutherans, and Baptists have each a church, and the Jews a synagogue. Besides good schools for the ordinary branches of educa-

tion, there are a grammar school, school of design, a theatre, and a concert-hall. The town has charitable institutions for the sick, orphans, and old people; also the provincial lunatic asylum, which can receive 220 patients. Pop. (1900) 18,490.

ZWEI'BRUCKEN. See Deux-Ponts.

ZWICKAU, *tsvĭk'kow:* picturesque, irregularly built, ancient-looking town of Saxony, in a pleasant valley on the left bank of the Mulde, 60 m. s.w. of Dresden. The river is crossed here by four bridges, two of iron. The town is the capital of the circle of Zwickau, and is the seat of a district court, court of appeal, and other public offices. Of its churches, most noteworthy is that of St. Mary, the finest Gothic edifice in the Erzgebirge, dating from 1453 (restored 1884), distinguished by its tall tower, from which is an extensive view; it contains a very fine altar-piece by the old German master Wohlgemuth, and other interesting works of art. There are also a splendid court-house and exchange; a cloth-hall; a district infirmary; a gymnasium, with library of 20,000 volumes; a burgher, Roman Catholic, trade, and other schools; an old castle, which has been converted into a work-house. The town is prosperous, and the population increasing. There are cloth manufactories, breweries, dye-works, chemical works, tanneries, oil and saw mills. The chief source of its wealth, however, and that of the neighboring villages, are the rich beds of coal in the surrounding district. There are also large iron-works in the neighborhood. The town is connected by railway with Leipzig, Dresden, and other places, and has considerable transit trade. Pop. (1900) 55,830.

ZWINGLI, *zwĭng'glē,* Ulrich (Huldreich): one of the leaders in the Reformation: 1484, Jan. 1—1531, Oct. 11; b. Wildhaus, in the canton of St. Gall, Switzerland; one of eight sons of the amtmann of that place. He studied first at Berne; then at the University of Vienna, where he applied himself to philosophy; and afterward at Basel, where, under the great Thomas Wyttenbach, he directed his attention to theology. Zwingli relates that Wyttenbach taught him that the death of Christ, and not masses, pilgrimages, and priests, took away the sin of the world; and that Holy Scripture, and not ecclesiastical tradition, was the rule of faith. He became pastor 1506 in Glarus. At this time his studies were chiefly in the Latin classics and the church Fathers; but having begun to learn Greek 1513, he from that time devoted himself to the New Testament. He wrote out the epistles of Paul in the original language, and learned them by heart, which was of great service to him afterward in his disputations. In the capacity of army chaplain, he attended the campaigns in Lombardy of the inhabitants of Glarus for the pope against the French, 1512, 13 and 15, for which service he received a pension from the pope

till 1517. In 1516 the liberal-minded administrator, Geroldseck, invited him to be preacher in the convent of Maria-Einsiedeln, famous for the pilgrimages to the images of the Virgin and Child preserved there for a thousand years. Here Zwingli began to preach against many abuses prevailing in the church, especially the superstition of pilgrimages: he also called on the bishops of Sitten and Constance to bestir themselves for the improvement of the church under the guidance of the Word of God. So little was he then suspected by the authorities of the Latin Church that the papal legate, Antonio Pulci, conferred on him, 1518, the diploma of chaplain to the Holy See; or was it indeed hoped by promotion to buy his silence? He was soon afterward called to Zürich; and he entered on his office as pastor in the great cathedral there, 1519, Jan. 1, with a discourse in which he declared himself for the pure gospel unfettered by glosses. In this office, to which was joined 1521 that of canon in the cathedral, he laid the foundation of his subsequent work as Reformer. The same cause that had stirred Luther into activity gave the impulse to Zwingli. In 1518 Bernardin Samson, a Franciscan from Milan, came to Switzerland to sell indulgences for the benefit of the papal court. Zwingli, who was still in Einsiedeln on Samson's first appearance, opposed him both there and afterward in Zürich with the whole force of his pulpit eloquence, and succeeded so well that Samson was sent out of the town of Zürich by the council. From this time Zwingli, though attacked by the monks and many of his brother canons, advanced with rapid steps in his reforming career; for the magistracy of Zürich supported his measures to such a degree that, as early as 1520, they issued an order throughout their jurisdiction that the Word of God should be taught without human additions. In 1522 the Reformation was formally established in Zürich. At this time Zwingli wrote his first book against the fasts of the Roman Church; he also began to study the Hebrew language. The offers of high promotion made to him by Adrian VI. could not make him waver. In 1523, Jan., the government of Zürich invited all theologians disposed to enter the lists with Zwingli to a conference at Zürich, which was attended by 600 clergy and laity Zwingli had arranged 67 theses as a summary of his doctrinal views, and defended them so ably against the attacks of the celebrated Joh. Faber, afterward bishop of Vienna, that the Council of Zürich declared in favor of Zwingli's doctrines, and upheld him and his assistants in adhering to them. The second disputation, 1523, Oct., at which Zwingli, before more than 900 people, spoke against the worship of images and the mass, was the cause of the removal of all pictures and statues from the churches in the city of Zürich and its jurisdiction; and this was followed 1524 by the abolition of the mass. In the same year Zwingli entered into the

married state with Anna Rheinhard, aged 43, widow of a nobleman of the name of Meyer von Knonow. In the following year he published his creed, *Von der wahren und falschen Religion* (Of the True and False Religion). He had thus, in a few years, placed the work of reformation in his native land on a solid footing. He now pressed zealously forward in the same course; while the magistracy of Zürich, who all along actively supported him, abolished the begging friars, brought matters relating to marriage before the secular courts, and instituted a better management of church property. On a great many points Zwingli was at one with Luther and the other German reformers, but in liturgical matters he carried out his reform more radically and rejected the dogma of the corporeal presence of Christ in the Lord's Supper. Zwingli was more firm and uncompromising than Luther in insisting on the supreme authority of Holy Scripture, and was less held by tradition and by the mediæval church. As to the Lord's Supper, his characteristic tenet was that it was not Christ's sacrifice in repetition, but the remembrance or commemoration in faith of that sacrifice; and as his idea of 'faith' included more than a mere belief or conviction, and made one of its chief elements to be a personal love to the Lord Jesus, his doctrine did not empty the Lord's Supper of its vital and spiritual meaning, as his opponents charged. In order to heal the breach that had, as early as 1524, broken out between the two parties of the new religion on the latter point, a meeting between the Saxon and Swiss Reformers was brought about by Philip, Landgrave of Hesse, at Marburg 1529. The conference lasted three days, but little progress was made toward unity of opinion: see SACRAMENTARIAN; LORD'S SUPPER, THE. In 1531 open war, which Zwingli had long foreseen, and of which he had warned his countrymen, broke out between Zürich on the one side and the Roman Catholic cantons of Lucerne, Schwyz, Uri, Unterwalden, and Zug on the other; and Zwingli, by command of the council of Zürich, took the field with the banner of the canton, which had always been borne by a priest. On Oct. 11 came the conflict; and as their opponents were more than double in number, and better led, the Zürichers were beaten, and Zwingli was among the fallen.—His collected works were published in Zürich 1545, in 4 vols.; a selection, in 2 vols., appeared 1819-21, edited by Usteri and Vögelin. See the Lives by Rotermund (1818), Hottinger (1820), Christoffel (1857), and Mörikofer (1869).

Of all the reformers, there is none more fitted to excite our love and respect than Zwingli. He was a statesman as well as a theologian. Alone among the Protestant leaders he saw that the religious and the political questions of the time formed one and the same problem, and could not be well dealt with separately. Fearlessly honest in purpose; with a clear head and eye for the truth:

less violent if less eloquent than Luther; more candid and open-minded if less systematic and penetrating in spiritual insight than Calvin; he stands before us quite as original if not as prominent as these reformers. His work was not so great as theirs, his influence not so extended; but his character was quite as genuine, and his labor, in some respects, quite as enduring.

ZWIRNER, *tsvĭr'nĕr*, ERNST FRIEDRICH: German architect: 1802, Feb. 28—1861, Sept. 22; b. Jacobswald, Silesia. He studied in architectural schools at Breslau and Berlin; worked under Schinkel a few years; and built costly houses and churches in the vicinity of the Rhine. His most conspicuous work was on the cathedral of Cologne, which had been begun about 600 years previous. He built the transept, the splendid n. and s. portals, but died, in Cologne, before the towers were completed. See COLOGNE.

ZWOLLE, *zwŏl'lĕh:* fortified town of the Netherlands, capital of the province of Overyssel; on the Zwarte Water, and by the canal called the Willemsvaart has connection with the Yssel. It is one of the finest towns in the kingdom, having many beautiful private and public buildings. Both within and without the gates are pleasant promenades and drives, shaded by large trees. The surrounding country consists of rich meadows and cultivated fields, adorned by pretty country-seats. Zwolle has three extensive suburbs—Diezenpoorten, Kamperpoorten, and Sassenpoorten. It is most favorably situated for commerce, having, by navigable waters and railways, communication with the provinces around the Zuider Zee, Hanover, England, and other maritime nations. The trade in farm-produce and stock is very great. Principal industries are shipbuilding, tanning leather, rope-spinning, beer-brewing, soap-boiling, weaving calicoes and stockings, book and plate printing, making salt, cooperage, and refining sugar. The most important buildings are the Town House, Palace of Justice, and Great Church. There are many excellent charitable institutions; and besides those for the ordinary branches of education, a flourishing grammar school, in which Pope Adrian VI. was partly educated; and a school of design. Zwolle has a cabinet of natural history, and a literary and a musical society. Here the poet Rhynvis Feith (1753-1824) was born, and here Thomas à Kempis lived 71 years. Pop. (1901) 31,277.

ZYGAPOPHYSIS, n. *zĭg'a-pŏf'ĭ-sĭs* [Gr. *zugon*, a yoke; *apŏphŭsĭs*, the process of a bone]: a yoke-piece; one of the articulating processes of the vertebra.

ZYGO-, prefix, *zī-gō-* [Gr. *zugon*, a yoke]: yoked; joined; having processes more or less resembling a yoke.

ZYGOMATIC, a. *zĭg'ō-măt'ĭk* [Gr. *zugōma*, the zygomatic arch—from *zugon*, a yoke]: pertaining to the

ZYGOMA, *zī-gō'ma*, a bony arch of the upper part of the side of the face; pertaining to the cheek-bone.

ZYGOPHYLLACEÆ, *zī-gō-fĭl-lā'sē-ē:* the Bean-caper family, a nat. order of exogenous plants, allied to *Rubiaceæ*, and containing about 100 known species, herbaceous plants, shrubs, and trees, natives chiefly of subtropical countries. They have opposite, generally pinnated leaves, without stipules. The flowers are solitary, or two or three together; the calyx 4-5 parted; the petals alternate with the calycine segments, and clawed; the stamens twice as many as the petals, generally rising from the back of small hypogynous scales; the ovary simple, 2-5 celled, with two or more ovules in each cell. The fruit is capsular, rarely somewhat fleshy, with four or five angles or wings. The most important genus is that of lignum-vitæ, *Guaiacum*. The abundance of species of *Zygophyllum* and some other genera constitutes one of the most striking features of n. African and Arabian deserts. The flowers of *Z. fabago* are employed as a substitute for capers, under the name of *Bean-capers*. Those of *Melianthus major*, in the Cape of Good Hope, abound in honey. The leaves of some species are used in the West Indies to scour floors. The Turks use the seeds of *Peganum harmala* both as a spice and for dyeing red.

ZYGOSPORE, n. *zĭg'ō-spōr* [Gr. *zugon*, a yoke; *spŏra*, seed]: a spore found by the conjugation and coalescence of two cells.

ZYLONITE: a material made by treating cellulose or vegetable fibre with nitric and sulphuric acids, dissolving the resulting pulp in camphor, and then drying it. In its liquid state, collodion, it was used in surgical operations as early as 1848; in 1855 zylonite was manufactured by Alexander Parkes of Birmingham, England, and put on the market as parkesine. About the same time several factories for the manufacture of zylonite were established in France and Germany, England, and the United States. In 1869 celluloid, a kind of zylonite, was first manufactured, and has entirely superseded all other forms of zylonite.

ZYME, n. *zīm* [Gr. *zumē*, leaven]: in *pathol.*, a word used to refer to the poisonous cause of zymotic diseases.

ZYMIC, a. *zīm'ĭk*, or ZUMIC, *zūm'ĭk* [Gr. *zumē*, leaven]: produced by fermentation.

ZYMO-, prefix, *zī-mo-:* connected with or producing fermentation.

ZYMOLOGY, n. *zī-mŏl'ŏ-jĭ* [Gr. *zumē*, leaven, ferment; *logos*, discourse]: the doctrine of fermentation. ZYMOM'ETER, n. *-ĕ-tėr*, or ZYMOSIMETER, n. *zī'mō-sĭm'ĕ-tėr* [Gr. *zumōsis*, fermentation; *metron*, a measure]: an instrument for ascertaining the degree of fermentation that has taken place in fermenting liquids.

ZYMOMETER, n. *zī-mŏm'ē-tėr* [Gr. *zumē*, leaven; Eng.

meter—from Gr. *metron*, a measure]: instrument for ascertaining the degree of fermentation in fermenting substances.

ZYMOSCOPE, n. *zī'mo-skōp* [prefix *zymo-*; Gr. *skopeō*, I see, I observe]: in *chem.*, an instrument contrived by Zenneck for testing the fermenting power of yeast, by bringing it in contact with sugar-water, and observing the quantity of carbonic anhydride evolved.

ZYMOSIS, n. *zī-mō'sĭs* [Gr. *zumōsis*, fermentation—from *zumŏō*, I cause to ferment—from *zumē*, leaven]: in *med.*, a morbid action or condition, as of the blood, supposed to be allied to fermentation. ZYMOTIC, a. *zī-mŏt'ĭk* [Gr. *zumōtikŏs*, promoting fermentation]: pertaining to or caused by fermentation. ZYMOT'ICALLY, ad. *-ĭ-kăl-lĭ*.

ZYMOTIC DISEASES: the large class of contagious diseases formerly supposed to be caused by reception into the system of a virus which acts as a ferment; the entire class of epidemic, endemic, and contagious diseases (see NOSOLOGY). The word *Zymotic* was employed to class together all the diseases characterized by the property of suddenly attacking large numbers of people. These diseases are characterized by a regular progress and duration of symptoms, and were at one time supposed to be due to some germinative matter which fermented or multiplied in the system especially during a so-called period of 'incubation' before the disease manifested itself. They are now called infectious diseases. According to the Germ-theory (q.v.) of infectious diseases, the origin *de novo* of a fever poison is as impossible as the production of a man or a dog without parents. Day by day we observe the discovery of one after another of the septic organisms causing disease, and it is but natural to conclude that after a time all the specific causes of the diseases referred to will have been traced. It is urged by those who oppose the germ-theory that there must have been at some time a spontaneous origin of the poisons, and that there still may be. This argument, however, has no weight. The question of the origin of the first contagium is to pathology what the 'origin of species' is to physiology. The pathologist who is investigating the causation of specific diseases is no more to be troubled with the former problem, than the biologist who is studying the phases of embryonic development should be with the latter. It has long been known that infectious diseases differ greatly in infectiveness. Few of the highly infectious diseases have at any time been supposed to arise *de novo*, but some of the less infectious—e.g., typhoid fever—are still in certain quarters said to be of spontaneous origin, and due to the decomposition of excrementitious matters. But those who hold such a view must show in what way the decomposing matter acts. Common septic bacteria, we know, cause diarrhea, but they do not cause typhoid

fever. A case of this fever, let us suppose, occurs in a small community. To all appearance the conditions of the place are unchanged, and the house effected does not differ from its neighbors. How is it to be explained according to the spontaneous origin theory? In such cases it seems to be forgotten by what subtle channels contagium may be carried; further, the fact is overlooked that the stage of incubation in such diseases is indefinite, and that a chance visitor may have left the poison behind, while apparently in good health. Every case of a specific fever can be traced by patient search to infection.

ZYMURGY, **n.** *zīm'ėr-jĭ* [prefix *zymo-;* Gr. *ergon,* work]: that department of technological chemistry which treats of the scientific principles of wine-making, brewing, distilling, and the preparation of yeast and vinegar —processes in which fermentation has the principal part.

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